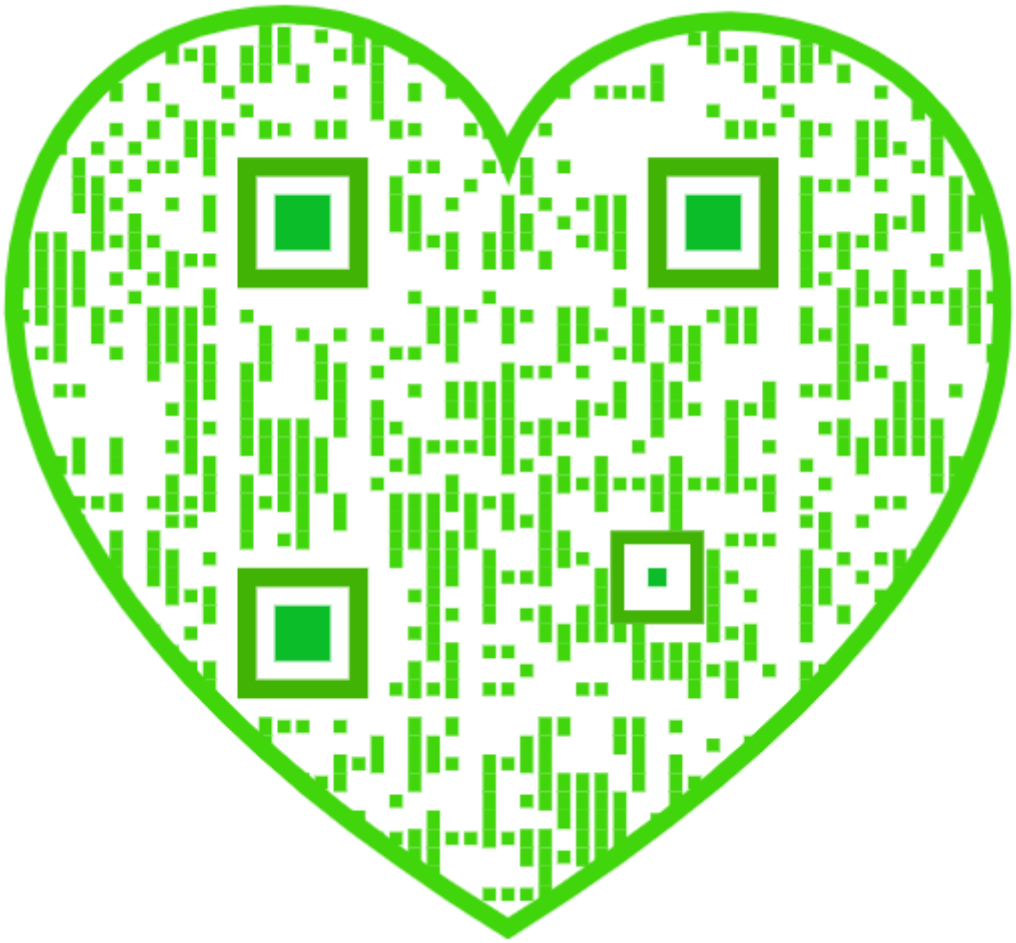

ON THE

CULTIVATION AND PREPARATION

OF

HEMP;

AS ALSO,

OF AN ARTICLE, PRODUCED IN VARIOUS PARTS OF INDIA, CALLED

DISCARDED
16 DEC 1967

SUNN,

WHICH, WITH PROPER ENCOURAGEMENT, MAY BE INTRODUCED AS A SUBSTITUTE FOR MANY USES TO WHICH HEMP IS AT PRESENT EXCLUSIVELY APPLIED.

COMPILED FROM VARIOUS AUTHORITIES,

BY ROBERT WISSETT, ESQ. F.R. & A.S.

CLERK TO THE COMMITTEE OF WAREHOUSES OF THE EAST-INDIA COMPANY.

LONDON:

Printed by COX and SON, No. 75, Great Queen Street, Lincoln's-Inn Fields.

1804.

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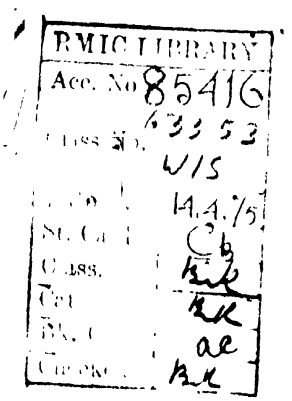
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THE HONORABLE COURT OF DIRECTORS OF THE UNITED COMPANY OF MERCHANTS OF ENGLAND TRADING TO THE EAST-INDIES.

THIS WORK

IS RESPECTFULLY INSCRIBED,

BY THEIR DUTIFUL AND OBEDIENT SERVANT,

East-India House,
3d April, 1804.

ROBERT WISSETT.

THE Lords of his Majesty's most Honorable Privy Council for Trade and Foreign Plantations, in a Letter to the Court of Directors of the East-India Company, dated the 4th February, 1803, recommended to the Court to encourage, as much as possible, the growth of strong Hemp in such parts of their dependencies in India, as might be best suited to the production of that article: in reply to which, the Court, on the 23d of the same month, informed their Lordships, that they would take the needful measures for accomplishing the object of their Lordships' wishes.

Hemp is not altogether unknown in India; but its properties are not sufficiently understood. It is at present cultivated for the purpose of obtaining an intoxicating drug. The substance of which the Natives make their cordage, fishing-nets, &c. is obtained from a plant called by the Country name [illegible] (the *Crotolaria Juncea* of Linnæus), and is prepared in a manner different from the Hemp in Europe. With the view of ascertaining whether this article was capable of being brought into use as a substitute for Hemp, the Board of Trade at Bengal were desirous, that a quantity of it should be procured, prepared after the European method; but the Natives were not inclined to depart from their established usage. A difference of opinion also arose between the Board and Mr. James Frushard, as to which of these methods was best calculated to give the requisite degree of strength to the fibre.

Upon referring to the authorities of the first writers on the subject, it appears that they are far from being in unison: it is therefore obvious, that in India this can only be ascertained, either as to Hemp or Sunn, but by a course of experiment, and making trials of the various methods that have been

laid down, under the sanction of those who are supposed to be the most conversant with the subject. To point out these modes, and to afford the means of contrasting them with each other, as also with the mode practised in India, is the object of the present Work. If it shall be found to afford any useful information to those who are already engaged in, or who may hereafter be disposed to enter upon, the culture and preparation of Hemp or Sunn in India, I claim no other merit than the labor of compiling it.

In doing this, I have consulted the most approved authorities. At the head of these I consider M. Du Hamel du Monceau, of the Royal Academy of Sciences at Paris, Fellow of the Royal Society of London, and Inspector General of the French Marine; and M. Marcandier, Magistrate of Bourges.

M. Du Hamel's work is entitled *Traité de la Fabrique des Manœuvres pour les Vaisseaux, ou l'Art de la Corderie perfectionné*, Paris, Quarto. 1747. This work is so extremely scarce, that Mills, in the fifth volume of his Practical Husbandry, says, the Author was not able to procure for him a single copy in all Paris; he was therefore indebted to his Patron, the Right Honorable James Stuart Mackenzie, for the loan of it from the library of the late Earl of Bute. I have also to express my acknowledgments to the President and Fellows of the Royal Society, for the use of one, which was presented to the Society by M. Du Hamel on its first publication.

The other quotations are from a translation of Marcandier's Treatise on Hemp, octavo, 1764,

Chambers' Dictionary of Arts and Sciences, by Dr. Rees.

The Encyclopædia Britannica.

A tract called England's Improvement, and seasonable Advice to Gentlemen Farmers, &c. how to cultivate Hemp and Flax, octavo, 1691.

An Essay on the European Method of cultivating and managing Hemp and Flax, by George Sinclair, Esq. Edinburgh, 1797.

A Manuscript Statement of the Mode of cultivating Hemp and Flax, in Russia, Prussia, and Poland, by James Durno, Esq. the British Consul at Memel.

The

The Mode of cultivating and dressing Hemp, by the Abbé Brulles, printed by order of the Lords of the Committee of Council for Trade and Foreign Plantations, quarto, 1790.

Mills's Practical Husbandry, 5 vols. octavo, 1792.

The Complete English Farmer, octavo, 1771.

An Essay on Hemp and Flax, by A. M'Donald, Surveyor, and Raiser and Dresser of Flax, octavo, Edinburgh, 1784.

Instructions for the Culture and Preparation of Hemp in Canada, in a Letter to the Lords of his Majesty's Council for Trade and Foreign Plantations, dated 17th of June, 1802, by John Taylor, Esq.

The Agricultural Reports of the Counties of Suffolk and Lincoln, published by the Board of Agriculture in 1797 and 1799.

The various particulars of information selected from these authorities I have digested and arranged under separate heads; by which it will be readily seen, wherein they accord or differ in the modes they have recommended. In the instances where they have quoted from each other in support of the same practice, I have, to avoid unnecessary repetitions, given only the original. I fear, however, it will be found, particularly in what relates to the [illegible] that I have not been altogether able to avoid this defect. In the documents to which I have referred, it would have been difficult, from the manner in which the subject is treated, to have selected the passages that relate to any specific head, without at the same time combining them with reasonings that were equally connected with others: I have, therefore, in such cases, (which are but few,) preferred repeating such observations, rather than hazard the leaving any head indistinct. This, in one respect, will be attended with an advantage, as the reader, who may be disposed to consult the Work for information on any particular point, may in general rest satisfied, that he will find every thing that is applicable to the subject, recorded under the head to which it has an immediate reference.

The work will be divided into Parts:

In the first, the articles will be considered as PRODUCTIONS OF THE SOIL.

In

In the second, will be set forth the subsequent PREPARATION which is requisite to render them merchantable.

In continuation of the subject, and with the more immediate view of bringing under notice every fact that may tend to elucidate the points which must ultimately come under discussion, first, as to the expediency, and next, the probability, of Hemp and Sunn from the East-Indies being rendered articles of permanent import; I have (in addition to the series of experiments now carrying on under the direction and superintendence of an Honorable Director, JOSEPH COTTON, Esq., the multiplicity of whose public avocations, particularly in the present important crisis of national affairs, have hitherto prevented him from making a final Report of their result), collected some valuable materials, which will enable me, hereafter, to give a descriptive Account of the various Uses to which Hemp is applicable, such as Rope-making, the Weaving of Sail-cloth, Sacking, and other important branches of manufacture, in which not only the interest of individuals, but the prosperity of the country, is materially involved:—Manufactures, whose very existence becomes endangered, the moment they cease to be at a certainty of being enabled to command the Raw Material in abundance. These will form the contents of a third Part; and in a fourth, I shall offer some considerations, tending to demonstrate, politically and commercially, the necessity of taking effectual measures for rendering the Nation less dependent upon foreigners for the supply of a commodity, so necessary in every respect, "as well for the "defence of the Realm as for the annoyance of our Enemies."

3d April, 1804.

PART I.

ON HEMP AND SUNN,

AS

ARTICLES OF CULTIVATION.

Description of the Plants.—Where grown.—Nature of the Soil best suited to their Growth.—Mode of Cultivation.—Directions for choosing the Seed.—Quantity of Seed required to be sown.—The Seasons for Sowing.—Directions to be observed in Sowing.—Method of Treatment after Sowing.—Indications of the Plants being ripe.—Manner of Gathering.—Method of obtaining the Seed from the ripe Plants.—Average Produce.—Profit arising from their Cultivation.

DESCRIPTION OF THE HEMP PLANT*:

CANABIS SATIVA—*LINN.*

THE Hemp-Seed (Plate I. *a*), or fruit of the Hemp-Plant, is an oval grain, almost round. At one of the extremities there is cicatrix, being the place where it was attached to the parent-plant: the other terminates in an obtuse point. This seed has on one side a ridge, which rises but very little, yet sufficiently to make it appear somewhat flattened. In general, Hemp-Seed is composed of a kernel, covered with an envelope, which is hard and brittle, without being ligneous; of a pearl-grey colour, inclining to brown. On pressing it between the teeth, on the side where the ridge rises, it easily separates into two parts, resembling the bowls of a spoon *(b)*; and the envelope being removed, we perceive another membrane, which is the immediate covering of the kernel. The kernel *(c)*, which is white, is composed of two oval bodies, thickish, convex on the outside, and flat where they join each other. These are generally called the lobes; on the ridge of which we see a small, long, rounded, and recurved body, which extends throughout the whole length of the seed, and is called the germ.

Those who are acquainted with the anatomy of plants know, that the lobes are a kind of *mammæ*, which, having imbibed the humidity of

*. Translated from the French of M. du Hamel du Monceau, Inspecteur de la Marine dans tous les Ports et Havres de France.

of the earth, communicate to the young plant, which is attached to them by the germ, a nourishment fit to make it vegetate till it can itself obtain its proper food, by means of the roots which it pushes into the ground.

It is also understood, that the rounded and recurved body, extending the whole length of the seed, and commonly called the germ, is the radicle or young root; and that the rudiments of the stalk, which are called the plumule, are inclosed within the two lobes.

Having stated these preliminaries, let us attend a seed through its various stages of germination. Let the seed be deposited in moist earth, or between two pieces of sponge kept constantly moistened (for water alone is sufficient to cause every kind of seed to germinate). As soon as the lobes begin to imbibe the humidity that surrounds them, they swell, and burst open the envelopes in which they are inclosed, and exhibit to view the radicle *(d)*, which immediately pushes downwards into the earth. The plant soon after makes its appearance above ground *(e. f. g. h.)*, crowned with the lobes, which are still covered with their envelopes. The lobes progressively spread, and, becoming thinner in proportion, form in a short time oval, longish, fleshy leaves: these are by botanists termed the seminal leaves *(i)*.

Hitherto the stem has not made its appearance. Every part yet produced by the seed, both in and above ground, belongs to the radicle. At length we see a small stalk, and two small longish leaves *(k)*, come forth from between the seminal leaves. The plumule then begins to shew itself, with the rudiment of the stalk, which by degrees becomes longer and thicker. The leaves which it bears, likewise grow larger. From the origin of these two opposite leaves two others spring forth, which are supported by a small stalk; and these new leaves cut the two first at right angles: the stalk which bears them grows longer, and the

leaves

leaves increase in size. From between these leaves, we see a new stalk spring forth, or rather a continuation of that which had already made its appearance. This bears new leaves, and so on in succession, till the plant attains its full height *(l)*.

If we now examine the root, we shall find one large central fibre, white and woody, from which smaller ones branch out in every direction.

Every grain of seed produces only one stem, which rises to the height of five or six feet*. The stalk is channelled, and hollow in the inside, where we find a white, soft, medullary substance. This substance is enveloped by a very tender pipe, which appears to be chiefly composed of a cellular texture, and of some longitudinal fibres. This is the part which is called the reed of the Hemp, or more commonly the *boon*. It is covered with a green bark, hairy, and rough to the touch, which is formed of a great number of woody fibres, extending the whole length of the stem: they do not appear to be reticulated, but are placed parallel to each other, and united by means of the cellular texture.

If we examine these longitudinal fibres by the microscope, we discover, that they are bundles of fibrils, or fibres of an extreme fineness: we likewise perceive, that these fibrils are twisted spirally. After macerating the fibres for some time, these twisted fibrils may be stretched out to a considerable length. *(m.)*

The leaves grow on opposite footstalks, two and two, and are at their origin always accompanied by two stipules, which is the name botanists give

* Near Bischwiller, in Alsace, are found Hemp-Plants, which at the bottom part of the stalk are more than three inches in diameter, and rise to a height of more than twelve feet. The strongest man is unable to pull them up by the roots.

give to the two leaflets which are found at the origin of the leaves of many species of plants. The leaves, (Plate II. *A)*, are divided as far as the foot-stalks into four, five, or a greater number of narrow segments, oblong, pointed, deeply indented in the margin, of a darker green colour on the upper than on the under side; rough, deeply furrowed above, and ridged beneath.

The flowers and fruit (seed) grow upon separate plants. That which bears the flowers, (and is called the Flowering Hemp, *Cannabis florifera* Off; *Cannabis erratica*, C. B. P.; *Cannabis fœmina*, J. B.; *Cannabis sterilis*, Dod. Pempt; and generally Female Hemp), should be called Barren or Male Hemp; because it bears the fecundating dust, without which the seed which grows on the other plants would not arrive at maturity, or at least would not vegetate when sown.

The plant which bears the fruit (seed), and which is called *Cannabis fructifera* Off; *Cannabis sativa*, C. B. P.; *Cannabis Mas*, J. B.; *Cannabis fœcunda*, Dod. Pempt; and commonly esteemed the *Male Hemp*, should be called the Fructiferous, Fruit-bearing, or Female Hemp; because it is this plant which, assisted by the fecundation which it receives from the male, bears seed capable of reproducing individuals of both sexes.

In general the male hemp *(BB)* is smaller, and all the parts of it more delicate, than those of the female. The stem, which is single, divides itself at the extremities into several branches, which terminate in slender delicate spikes *(C)*, ending in a point; whilst the female hemp, on the contrary, terminates in tufts of leaves of a considerable size (Plate III. *D)*, among which we find the seed *(E)*; so that the male and female plants may be distinguished at a considerable distance.

The flowers (Plate II. *F)* of the male hemp grow from the axillæ of

of the small longish leaves *(G)*, near the summit of the stem. The flowers are disposed in clusters; in general two clusters hang from each axilla, and each cluster bears nine or ten flowers.

Before the flowers expand, the flower-buds *(H)* resemble little oval boxes, indented and divided like a melon; and these divisions are the more apparent, as the ridge is greener than the part indented, which is of a whitish colour.

When the flowers are expanded, they consist of a calix *(K)*, of a pale green, which becomes purplish as they fade. This calix is entire, although divided almost to the base into five parts. It contains no petals, but five stamina *(L)*, which are attached to the bottom of the flower by short and very slender filaments. *(M.)*

The antheræ *(N)* are thick, of a bright yellow, and divided into two longish cells, full of a very fine powder, the grains of which, when examined with the microscope, appear to be round, and resemble a heap of small shot. This powder probably is, or contains, the fecundating matter.*

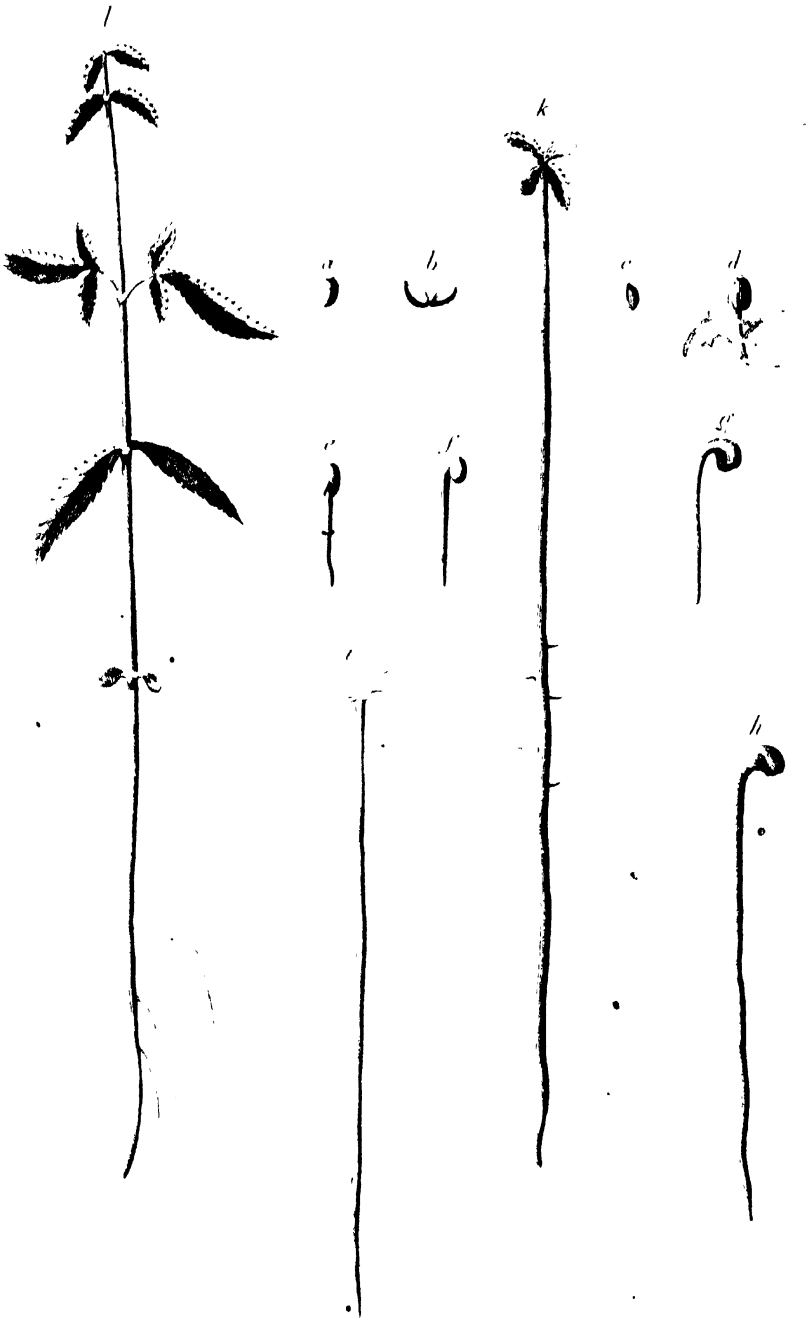
The fruit, or seed, grows in great abundance along the stem of the female hemp. From the axillæ of the leaves there arise small branches (Plate III. *O*), which bear a very great number of small leaves *(P)* and stipules *(QQ)*. In the axillæ of these small leaves and stipules we find the seeds in the following order:—Betwixt two seeds, growing at the axilla of a leaf, there arises a small and frequently very short stalk, which is terminated by two leaves; and in the axilla of each of these two leaves, we find two other seeds and a small stalk. These seeds are not

* Mr. Bernard de Jussieu, having scattered some of this dust on water, and placed it under the focus of the microscope, observed a great number of grains which opened and diffused an oily liquor, that floated on the water without mixing with it.

not preceded by any flower. A membranaceous calix, shaped like a monk's cowl, hairy, and of a greenish-yellow colour, and terminated by a long point, encloses the pistils, the base of which becomes the seed, and is terminated by two whitish filaments.

It is probable, that the name of Male Hemp has been given to the plants which bear the fruit, merely because they are larger and stronger than the others: but this will not be deemed a sufficient reason by those who have observed, that among animals, and especially in the Genus of Birds, there are many species, the males of which are considerably smaller than the females. I trust, therefore, it will be readily allowed, that we act with propriety in giving the name of Female Hemp to the plants which produce the seed. But that the plants which produce only the flowers are the males, will not, perhaps, be so readily admitted by such of our readers as are unacquainted with the observations made relative to this part of the vegetable economy. These observations, however, prove beyond a doubt, that there are two sexes in plants, as well as animals. It has been ascertained by experiment, that the co-operation of the two sexes is necessary to give fecundity and the power of reproduction to the seed of plants; in the same manner as, in the feathered race, the egg of the duck and hen, for example, will not be fecund, or capable of producing a duckling or chicken, without the co-operation of the drake or cock. But it may be necessary to observe, that, to enable the male-plant to impregnate the female, it is not requisite that they should touch or be close to one another; for it is very probable, that it is the dust contained in the stamens that conveys the fecundation. This dust is very fine, and extremely light, so that the least agitation of the air wafts it in every direction: and there is so prodigious a quantity of it, that the whole of the surrounding air must be filled with it, when at the proper season the capsules which contain

it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it burst open. If but one particle of this dust be deposited in the proper organ, one of the seeds will thereby be fecundated: and it is, perhaps, owing to the want of these grains of dust, that so many abortive seeds are found under the female hemp-plants. It would seem, that Nature had formed the male hemp for no other purpose but to produce this fecundating dust; for as soon as the flowers have blown, and shed this dust, the male stalks wither and perish.

At the time when the fecundating dust is shed, the fruits or seeds are not yet formed; and therefore the female stalks subsist a considerable time longer than the male, and do not begin to decay, till the seeds have attained full maturity.

It is not without sufficient reason, then, that we have resolved to change the names which custom has assigned to the plant which bears the flowers, and to that which bears the seed; and we shall, accordingly, call the floriferous plants the Male, and the fructiferous the Female.

Hemp has a penetrating aromatic smell, which is very disagreeable to many persons.

PLATE I.

Refers to the Germination of the Plants.

a—the Hemp-seed.

b—the Shell which encloses the Kernel.

c—the Kernel.

d—the Radicle coming forth from between the Lobes.

e, f, g, h,—the same in different stages of its growth.

i—the seminal Leaves.

k—the Leaves of the Plant beginning to appear; and the lateral Roots beginning to shoot out.

l—a Stalk of Hemp, in a more advanced Stage of Growth.

m—a small Piece of the Bark of the Hemp-plant, macerated, dissected, and viewed through the Microscope.

PLATE II.

The second Plate represents the Male Hemp.

A—represents a detached Leaf with its Stipules.

B, B—represent the Top of the Stem of a Male Hemp-Plant.

C, F, G—represent the Clusters of Flowers, the Leaflets, and the Stipules, which grow on that Stalk.

H—an unexpanded Flower-bud.

I—a Flower-bud, beginning to expand.

K, K—full blown or expanded Flowers, exposing to view the Stamina, *L*.

M, N—a Stamen.

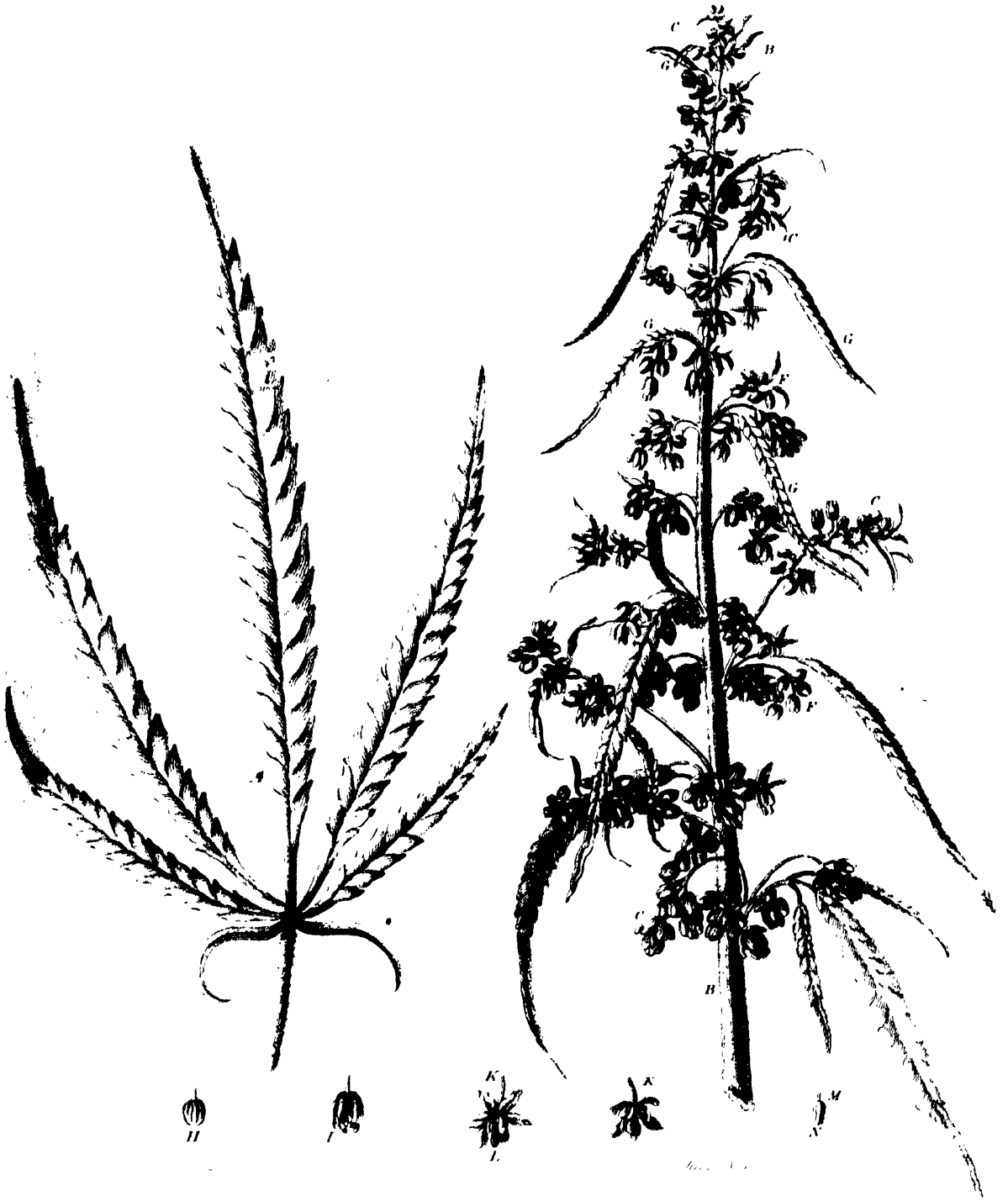
M—the Filament.

N—the Anthera.

PLATE III.

The third Plate represents the upper Part of a Stalk of Female Hemp.

D, E, O, P, Q—the Clusters of Seed-buds, the Stipules, and the Leaves.



D
D
O
D
D
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P
Q
P
P
O

DESCRIPTION OF THE PLANT.

HEMP (*Cannabis sativa*, LINN.) is a genus of the Dicœcia Pentandria class. Its characters are these: it is male and female in different plants.

The male flowers have a five-leaved concave empalement, without petals; but have five short hairy stamina, terminated by oblong square summits.

The female flowers have permanent empalements of one leaf, without petals; but a small germen, which afterwards becomes a globular-depressed seed, inclosed in the empalement. There is but one species of this plant.

Chambers's Dictionary, Art. Hemp.

CANNABIS, in botany, a genus of the Pentandria order, belonging to the Dicœcious class of plants, and in the natural method ranking under the 53d order, *Scabridæ*.

The calyx of the male is quinque-partite, with no corolla.

In the female, the calyx is monophyllous, entire, and gaping at the side. There is no corolla, but two stiles. The fruit is a nut, bivalved, within the closed calyx. Of this there is but one species, the *Sativa*.

Encyclopædia Britannica, Art. Cannabis.

HEMP, in botany, *Cannabis Sativa*. The root is long, and comparatively slender, divided into branches, and full of fibres.

The stalk is thick and ridged, or somewhat angular. It grows from six to twelve feet in height, and taller in warm than cold climates.

The leaves are divided into five, in the manner of the fingers; they feel rough, and are notched at the ends.

It

It is a plant of the Dioecious class of vegetables.

The male plants are distinguished from the female in cultivation and management of the crop: but an error has very generally prevailed in calling the really male plants, (those which afford the *farina fœcundans*,) the female, and the seed-bearing plant the male.*

The male is more forward in its growth, and rises to a greater height, by about six inches, than the female, whereby the fecundating dust or pollen is easily shed on the latter; and the flax, or fibres of the male, are much more delicate and fine than those of the female.

Mr. Geo. Sinclair's Essay on the European Mode of Cultivating and Managing Hemp and Flax, Edin. 1797

Hemp is commonly distinguished into two sorts; one that grows wild, *Cannabis silvestris*; the other produced by cultivation, *Cannabis domestica*. This latter is of two sexes; the male, *fructifera*; and the female, *florifera*: but both improperly so called; for it is more natural to call that the female which bears the fruit, than the other that bears the flower. The seed and the root of the wild hemp are like those of the wild mallow; the stalks are smaller, blacker, more rough, and about a foot and a half in length; the leaves are like those of hemp raised by cultivation, but more rough, and likewise blacker.†

The root of hemp produced by cultivation is six inches long, or thereabouts, of a whitish colour, ligneous, undivided, and running to a point, having fibres only on two lines, diametrically opposite to one another, when it is not straitened for want of room, and thick in proportion to the stalk it bears. The stalk is round from the root to the first ramification;

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* Du Hamel has set this right. The Abbé Brulles, and the Editors of the Encyclopædia Britannica, have followed the Error. R. W.

† Nigriore folio et asperiore. *Plin. l.* xx. *cap.* 23.

tion; it then assumes a quadrangular form, and is fluted, hollow, ligneous, covered with a greenish bark, composed of filaments, hairy and rough to the touch. At proper distances, this bark is secured from place to place by six small fastenings, which keep it close to the stem, like so many little nails regularly ranged on the circumference of the same circle, and almost equally distant from one another. Its length and thickness are various, according to the difference of the soil, of the method of cultivation, of the climate, and of the seasons. Some of it rises to the height of eight or ten feet, and the stalks look like so many little trees: others seem to pine away on the ground, and scarce get to the height of two or three feet; sometimes less. A grain of hemp-seed, sown by itself in a soil that agrees with it, commonly produces a stalk very large* and firm, with many branches, and looks like a little tree.† If it is of that sex which produces seed, it will yield a great many grains, and those very beautiful; but its bark, being too hard and thick, will not be very fit for manufacturing. On the contrary, seeds sown in a field that is properly prepared for the purpose, and where the plants rise close to each other, produce stalks that are straight, smooth, without branches, softer and more tender than the former; and the bark of such being smooth, fine, and soft, is much valued for several uses. The leaves grow in pairs, opposite to one another: they are divided into many segments, being narrow, oblong, sharp-pointed, jagged, full of veins, of a deep-green colour, rough to the touch, and of a strong smell that affects the head.

The flowers that grow on the female stalk, as it is commonly (but erroneously) called, issue from the alæ of the leaves, on a pedicle of four

* Of such stalks they make a kind of charcoal, fit to enter into the composition of gunpowder.

† Quod ad proceritatem attinet, rosetum agri Sabini arborum altitudinem æquat. *Plin.* l. xix, c. 2.

four little clusters, lying in the form of a St. Andrew's Cross. They have no petals, and consist of five stamina, with yellowish summits, in a calyx of five leaves of a purple colour without and whitish on the inside. These flowers are not followed by any fruit; and on the other hand, the fruit on the stalks that produce it is never preceded by any flower.

Whatever the order of nature may be in the vegetation of this plant, both the male and the female stalks are produced indiscriminately from the grains of seed that grow on the same stalk, and the difference cannot be known till they come to blossom. We know not, when we sow hemp, what quantity of either sex will be produced, nor which contributes most to the propagation of the plant. They cannot, however, be easily distinguished till sixty days after they are sown; but this observation, hitherto, does not appear to have been of any consequence.*

The fruit grows in a great number of bunches, at the end of the stalks and branches which naturally produce them. This fruit is terminated by a forked style when it is in embryo, and is wrapt in a membrane, which secures it till it comes to maturity: then the pistillum changes to a roundish grain, forces the membraneous capsule, which contains it, to open; and we then discover a round smooth grain, somewhat flattened, and of a shining grey colour, containing, under a thin shell, a tender, sweet,

* The time when the hemp blossoms cannot be easily ascertained; for it depends on several circumstances. Sometimes it is not above a foot high. When this is the case, the hemp continues weak, and grows little or nothing at all higher. This is sometimes occasioned by great heats, or other unfavourable accidents; at other times it arrives to the height of four or five feet before it blossoms, and grows almost as much after. The hemp which bears the flower commonly gets before that which produces the seed, and rises about half a foot above that which bears the grain. This superiority, in the order of Nature, may be well accounted for, if it is true, that the powder which issues from the flower serves to convey fertility to the grain on the stalks that bear the seed.

sweet, oily, white kernel, of a strong smell, that intoxicates when it is fresh. This kernel is covered with a green pellicle, terminating in a point on the side next the germ, which is very singularly situated.

This grain, which is called Hemp-seed, is no less useful for its peculiar qualities, than for those which it has in common with the whole plant. Its substance, considered as a seed, is soft, fat, oily, and gummy; it ferments, conceives heat, and springs up with equal facility. Its pores, being large, tender, and flexible, receive greedily the impressions of heat and humidity, which transmit to them the nutritious juices supplied by a fat, light, and well-labored soil. Its fibres, after a quick germination, unfold themselves, grow up, and attain strength; and the gum, being the principle of their union, supports and preserves them. Besides the use of its oil in physic, it is also employed with great advantage in the lamp, and in coarse painting. They give a paste made of it to hogs and horses to fatten them: it enters into the composition of black soap, the use of which is very common in the manufactures of stuffs and felts; and it is also used for tanning nets.

A grain of Hemp-seed, seen by the help of a microscope, presents at first a greyish epidermis full of veins, the compartments whereof appear like a sort of scales. Under this first cover you see a brown olive-coloured bark, extremely smooth on the inside, formed of two shells, which separate exactly in the middle, like those of a nut; the seam that joins them being quite imperceptible. Under a green cover its kernel, in the form of a little orange, bears its germ, produced along one of its sides, which makes it look a little flatted. When you have taken up this pellicle, you find a white kind of matter, consisting of two lobes joined together, which evidently form a kind of head: these lobes are very distinct, and by the germination are made to swell, open, and separate. Its germ, which is roundish, bending back along the whole external

length

length of the grain, under the seam which joins the two shells, terminates in a point, and forms a kind of tendril, which is the only part that pierces the ground to form the root. The other end of the germ, which lies concealed between the two lobes that enclose and preserve it, appears like an exceeding fine and delicate sort of lance, which is called the *feather*: from it issue the two leaves that appear first, and we may imagine it to be the true principle of its germination and life. These two lobes are also changed into two sorts of thick green leaves (called by the Botanists the seminal leaves) of an oval form, but not indented, which serve for a rampart and preservative to the springing leaves. The whole of this white matter seems to be fat and spongious, and its pores appear to be no less open than those of snow: and it is, no doubt, owing to the situation of its germ, and the softness of its whole substance, that Hempseed, beyond any other sort of grain, has so great a disposition to ferment and spring up, almost as soon as sown.

The bark, as it appears upon the stalk, forms a green, knotty, rough, or prickly covering to it. The knots or prickles are mere excrescences of the gum, of which the whole bark is composed; but they have different degrees of force and adhesion. This first superficial gum serves only to keep the fibres of the Hemp close together, and as a kind of mastick, to cover, strengthen, and protect them against the inclemency of the air, the dust, and the rain. It dissolves, exfoliates, and breaks when the bark is watered.

The inside of the bark, which touches the stem, is smooth, soft, and white; the fibres are very distinct from each other, and appear perfectly in all their dimensions, by means of the watering just mentioned. It was not observed in former times, that the thread had its existence in the plant, without any dependence on the operations of art; that the labour is confined to cleaning, dividing, and separating the soft fibres of

which

which the bark is composed; and that this bark is a kind of natural rib-band or scarf, the threads whereof are applied and joined together, lengthways only, by a dirty glutinous humour, which must absolutely be dissolved and separated, because it is equally hurtful to the workmen and the work. The threads themselves also consist merely of a gum, but of one which is of a different quality from the superficial gum: they are supple, strong, and resist the impressions to which the former give way. Every fibre is composed of gummy globules, that are very fine, transparent, and bright, when sufficiently cleared from the superficial gum that surrounds them, and which the microscope shews to be of a different sort. All this will appear plain, if you take a few fibres from a thread that is thoroughly bleached. The fibres of Hemp in this state are nothing different from those of cotton and silk, which makes it reasonable to consider them as materials of the same kind: and it is a convincing proof of this, that, when they are mixed and carded together, there appears to be a complete sameness in the whole mixture.

Marcandier.

The HEMP-PLANTS are of two kinds, *viz.* the male, which yields a farina, or powdery matter; and the female, which bears the seed. The action of the male farina upon the female plant is necessary for the production of the seed, and its effects may be promoted by artificial agitation, at the time when the male plants are plucked from amongst the female.

Taylor's Instructions.

HEMP CULTIVATED IN BENGAL.

Hemp, *Cannabis sativa*; *Banja* in Sanscrit; *Bunga*, *Bungh*, or *Bang* of the Hindoos; *Bang* of the Persians; *Kinnub* of the Arabians; is, no doubt, our own famous plant, now so common and useful in Europe. I have, at different times, examined various figures and descriptions, as well as the plants reared from Europe-seed, comparing them with our Indian plant through its various stages, and can discover no difference whatever, not even to found a variety on. Perhaps few vegetables, so widely diffused over almost every part of the known world, and under the immediate management of man, have undergone less change. It is perfectly familiar to all the nations in India, I may say of the warmer parts of Asia; yet I cannot discover, that the fibres of the bark have ever been employed by them for any purpose. It is cultivated in small quantities every where (in India) on account of its narcotic qualities.

The leaves of the male plant, and flowers of the female, are the parts in most general use.

I have repeatedly applied for the seeds of all plants reared in China, and other countries to the eastward of the Bay of Bengal, as well as to almost every part of India we have any communication with, for an account of the plants employed to supply materials for cloths and cordage, and for their seeds; but never could learn, that *Cannabis* was one of them, nor were its seeds ever sent to me as such.

Dr. Roxburgh's Essay on Hemp, on Bengal Board of Trade Cons. 12th Sept. 1801.

The Hemp-plant has been cultivated in Bengal from time immemorial, for the purpose of intoxication; but is never used by the natives for

for cordage or cloth, as in Europe. The plant is called by them *Ganja;* and the intoxicating preparation made from it, *Bang.*

There being no perceptible difference between the European and the Bengal plant, there is no doubt that the latter, if duly prepared, might be applied to every purpose for which the former is used, and that it would be equally fit for them: but it would require to be cultivated in a different mode from that used by the natives.

There are many other vegetable substances used by the natives for cordage, &c. such as,

The Murgha	- -	*Aletris Nervosus.*
Kantala	- -	*Agave Americana.*
Douchy	- -	*Robinia Cannabina.*
Merty Paut	- -	*Hibiscus Cannabinus.*
Ulet Cummul	- -	*Abroma Angusta;* as also
Coir and Gomuti	- - -	*Palms.**

but the principal, and those by far in the greater use, are,

Sunn	- - -	*Crotolaria Juncea.*
Paut	- - -	*Corchorus Olitorius.*

The fibre of the Sunn, both for durability and strength, is superior to the Paut."

Mr. Fleming, Bengal Cons. 5th May, 1801.

CHITTAGONG.—Very little *Cannabis sativa* is raised. It is used in preparing the intoxicating drug, *Bang.*

COMMERCOLLY.—There are two species of Sunn; the best called *Phool,* the other *Boggy.*

The

* See Dalrymple's Collection of Voyages in the Southern Ocean; also Hortus Amboinensis, vol. i. cap. 12. R. W.

The *Phool-Sunn.* This plant grows about four feet high, and produces the strongest, whitest, and most durable kind of Sunn.

Boggy-Sunn. This plant grows about seven feet high, and the Sunn produced therefrom is darker-coloured, and not so strong as the Phool-Sunn.

MALDA.—*Ganja, Cannabis sativa,* grows spontaneously, and thrives luxuriantly in many places about here. The Riotts cultivate it for *Bang.*

Board of Trade Cons. 12*th June*, 1801.

JUNGYPORE.—No article used in this country for cordage is the real Hemp cultivated in Europe.

There are four species of plants cultivated, which produce different kinds of raw materials, fit for cordage and other uses. The first is called by the natives *Ghore-Sunn*; and I suppose this to approximate the nearest to the Hemp cultivated in Europe, though I am by no means certain that it is the same plant.* According to the best of of my recollection, the European Hemp-plant differs in appearance from the Ghore-Sunn, in flower, leaf, and seed: the former is male and female in different plants from the same seed; they are cut and pulled separately, and the female plant alone affords seed. There does not appear to be any distinction between the plants of Ghore-Sunn; they are all alike in leaf and flower, and every plant produces seed. Some of this species is produced in the country to the westward of the Cossimbazar river; but the major part of the consumption is imported from Dinagepore, Purneah, Tirhoot, and other districts in the neighbourhood of the latter place.

The article of this description next in quality to the Ghore-Sunn is the *Paut* or *Sanchee-Paat:* but as it does not grow to the height of above four

* Certainly not. The Ghore-Sunn is the *Crotolaria Juncea;* the Hemp is the *Cannabis sativa* of Linnæus. R. W.

four feet, and shoots out many lateral branches, which render the fibres very difficult to be separated from the woody parts, it is by no means a profitable article to the landholder, nor have I ever observed it cultivated in any considerable plots. It is, in general, found in villages, or near the houses of the inhabitants; the leaves and tender shoots being used by them as an article of food.

The third plant producing a species of Hemp is called by the natives *Cooch Murden Paat.*

The fourth description of plant producing Hemp is called *Amleeah Paat*; and this is in the most general use throughout the country, for coarse cordage and other purposes, which do not require the fine twine produced from the Ghore-Sunn.

Bengal Board of Trade Consultations, 14th Jan. 1793.

HEMP CULTIVATED AT BOMBAY.

There are two kinds of Hemp-plants cultivated in Salsette. The first is the *Hibiscus Cannabinus** of the botanists. The leaves of it and the young fruit are used as an article of food, and the fibrous part is employed for cordage, &c.

The second kind of Hemp-plant cultivated at Salsette is of the Genus *Crotolaria.* This is what was carried to England by Capt. Isaacke of the Skelton Castle, and what is most esteemed for its strength and durability. I do not know if this be the same plant with the Sunn of Bengal.†

* Mr. Fleming, (see page 19,) calls this the Merty Paut of the Bengalese, and is probably correct; for, the supposed hemp, brought from Bombay by Captain Isaacke of the Skelton Castle, in 1802, had a very different appearance from the Bengal Sunn.

† The Sunn of Bengal is the *Crotolaria Juncea* of Linnæus.

THE RAMAKRISHNA MISSION INSTITUTE OF CULTURE LIBRARY 85416

The Court of Directors seem to think, that the hemp of this country is derived from the same plant with that of Europe; for they propose sending out seed to improve our Hemp. The fact is, that the plants of the two countries are individuals of different genera,* and differ from each other in all their characters. We have here the *Cannabis*, or Hemp-plant of Europe; but little use is made of it, but for the purpose of intoxication. I am told, that it is sometimes employed in Malabar for making hemp for fishing-nets.

Dr. Helenus Scott to the Bombay Government, 31st May, 1803.

HEMP,

WHERE GROWN.

HEMP is one of the plants which Nature has not only made necessary but also common, and suited to every sort of soil as well as to every climate. It is true, that countries which are extremely hot are not favourable to it; but, as this plant is but a short time in the ground, if a country is at all habitable by men, we are of opinion they may also cultivate Hemp. Rainy seasons are proper enough for sowing it; and, when it is once in a condition to cover the ground, the dews alone, which are plentiful in these countries, will be sufficient to bring it to maturity. It will not, to be sure, grow so high as in temperate or colder

* Meaning the plants from which the natives in India make their ropes, fishing-nets, &c.

colder climates; but it may be, perhaps, on that very account, the more fit for use.

Marcandier.

Although Hemp, either in its wild or cultivated state, is to be found in almost every part of the globe*, yet, as the principal consumption is for naval purposes, the growth of it, upon an extended scale, is more immediately confined within the limits of Europe. It is raised in various parts of France, Spain, Holland, Denmark, Sweden, and in several of the Italian States; but, with the exception of a trifling export from Italy, none of these countries produce it in quantities sufficient for their internal consumption. The grand mart for it, as an article of commerce, is Russia, where it is grown in large quantities, and of the best quality, in the southern and western provinces, bordering upon Poland, and in the provinces of Poland, which, in the late partition of that kingdom, have fallen to the share of Russia. The rivers of Poland, which flow to the northward, and fall into the Baltic in the Prussian dominions, pass through some of the countries where Hemp is cultivated; but as such countries belong to Russia, and she commands the course of the rivers, the whole of the Hemp near the Baltic may, with propriety, be said to be in the power of that government.

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* Hemp is grown in Persia, Egypt, and various parts of the East-Indies, China, New Zealand, Canada, Nova Scotia, &c. A small quantity is cultivated in England and Ireland; perhaps not more than three hundred tons.

HEMP,

NATURE OF THE SOIL BEST SUITED TO ITS GROWTH.

Most sorts of soil are or may be made fit with good manuring, to sow Hemp upon. The best is accounted to be a warm sandy ground, mixed with earth; and of this sort of earth, fit places to sow Hemp on are old meadows grown over with moss; old stack-yards; and places kept in the winter for the lair of sheep or cattle. If your ground is something barren, you may enrich it, as you do all other sorts of ground.

England's Improvement, 1691.

Hemp is always sown in a deep, moist, rich soil, such as that of Holland, Lincolnshire, and the fens of the Isle of Ely, where it is cultivated to great advantage, as it might be in many other parts of England, where there is the like soil; but it will not thrive on cold clay or stiff cold land. It is esteemed very good to destroy weeds, which is no other way effected but by robbing them of their nourishment; for Hemp greatly impoverishes the ground, so that the crop should not be repeated on the same land.

Miller's Gardeners' Dictionary.

In Italy Hemp is sown on their best lands, which are rich, strong loams, on which they are at all possible pains to procure a fine friable surface. For manure they use dung, pieces of rotten cloth, feathers and horns, brought from Dalmatia. The plant, however, may be cultivated upon ground of every kind: the poor land producing that which is finer in quality though in smaller quantity; whereas strong and rich land produces a great quantity, but coarser. It does not exhaust the land on which it grows, like flax; whence it is probable, that, if properly managed,

naged, and care be taken in the cultivation, it might be found to supersede flax entirely. A Suffolk Manufacturer, who has treated of this subject in the Annals of Agriculture, states, that it may be raised for many years successively on the same ground, provided it be well manured. A variation in the quality of the soil makes an alteration, both in the quantity and quality of the Hemp.

Young's Annals of Agriculture.

Hemp requires to be cultivated in a deep, rich, moist soil: black moulds, and the feculent earths deposited by the overflowings of rivers are particularly recommended. The soil should neither be wet nor too dry, but in such a state as to retain a sufficient quantity of moisture. It should be as open and as free as possible, that the roots, which are disposed to take deep hold of the ground, may have freedom to push forth their fibres every way.

Sinclair's Treatise on Hemp and Flax. Edin. 1797.

In the northern parts of Europe, the best crops of Hemp are produced on black, not morassy, open, gravelly soil. Where the ground is over-rich, the growth becomes exuberant, and consequently coarse. As quality is preferable to quantity, care is taken to reduce such a superior soil to the state of cultivation in which the article is found to thrive best. An inferior soil requires to be raised to the like state.

Mode of cultivating Hemp and Flax in Russia, Prussia, and Poland, by James Durno, Esq. British Consul at Memel. 1795.

In Suffolk the soil preferred is what is called in the district *mixed land;* that is, sandy loam, moist and putrid, but without being stiff or tenaceous: in one word, the best land the country contains. It of course does well, as may be supposed, on old meadows and low bottoms near rivers.

The Rev. Mr. Mills of Bury says: Hemp delights in a black rich mould; the richer* and stronger† it is, the better. It has sometimes been sown upon the breaking-up of an old ley, and, where there has been sufficient depth, with success.

Agricultural Survey of Suffolk.

There is no soil in which Hemp will thrive so well, as in fine, fat, rich, black-moulded sand. Indeed there is hardly any soil so little addicted to weeds as that I have now described.

Complete English Farmer.

Coarse Hemp, such as is required for the manufacture of cables, hawsers, and other heavy rigging, requires every where an abundance of manure and land of the richest quality.

In Lincolnshire, where strong and heavy Hemp is grown, the Hemp-gardens are small, and near the houses of the growers. These gardens absorb vast quantities of manure, and produce Hemp every year, without any alteration of crop, or any change, except that, in years when the Hemp is pulled early, a few turnips are sown for a stubble-crop.

In Russia, the same mode of cultivating Hemp on small patches of land, near the houses of the growers, prevails, no doubt, from the facility of getting manure upon it. In Romagna, where the best Hemp in Italy is grown, the inhabitants have a common saying: *Canape cresce dappertutto.*

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* A rich black soil is best for every thing; but it would too much discourage the culture, if it were supposed to be essentially necessary. I have seen it thrive well, sown after turnips fed off, on good common friable loams. Manure will make it thrive on any except very dry soils.—*Arthur Young.*

† A good and friable clay, well manured with mould, will anwser. The soil cannot be too rich.

dappertutto, ma la Canape á vendere ne in cielo, ne in terra, ma nel letame.*

Letter from the Rt. Hon. Sir Joseph Banks to the Committee of Lord of the Privy Council for the Affairs of Trade. 30th July, 1802.

The ground intended for a Hemp-field ought to be the very best that can be afforded, either near the house, or along some stream or water-ditch, yet so that there is no room to fear an inundation. To render this ground fruitful, we must not spare either manure or labour.

Marcandier.

The soil for Hemp should be a soft rich loam, easily brought into fine tilth, and it should be well manured. Newly broken-up land is found to be peculiarly good for this plant; but flat grounds lying on the sides of rivers, and enriched by the sediment left on them when the waters overflow, are the best of all for it.

If Hemp is to be sown on very strong soils, they must be brought into so good tilth, and be so well manured, that their mould may remain loose. In this case, such soils yield very great crops.

It is the custom in some countries to form Hemp-grounds, which are appropriated solely to this purpose; whereupon the author of a very judicious Account of the Culture of Hemp, in the Memoirs of the Royal Society of Agriculture at Tours, p. 32, justly observes: "That, besides "that all soils delight in a change of plants, Hemp is so far from impo- "verishing the ground, that the leaves which fall from it become a "sufficient manure, and the depth to which the roots go, especially if "the crop of Hemp be great, leave the ground sufficiently loose to sow "upon

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* Hemp may be grown every where; but it cannot be produced fit for use, either in heaven or earth, without manure.

" upon it even a crop of wheat, immediately after the Hemp has been " pulled, without any other expense than sowing the seed and harrow- " ing it in; or if turnips, or a spring-crop, be more convenient to the " farmer, these also will thrive well after the Hemp. It is said, that the " Hemp which grows on an established Hemp-ground, is softer and more " silky than that which is raised elsewhere: but the difference, if any, " is very inconsiderable; for the Hemp which grows in the other parts " of Anjou, for example, is found to be as good as that which is pro- " duced by any of the few established Hemp-grounds in that province."

Mills's Husbandry.

Hemp requires a dry, deep, brown, rich, warm soil, secure from the north and east winds, and exposed to the sun.

A. M'Donald's Essay on raising and dressing Hemp and Flax. 1784.

The soil for Hemp should be rich, deep, light, and moderately dry. *Of this description much can be found on the banks of the creeks and rivers in Canada.*

Taylor's Instructions for the Culture and Preparation of Hemp in Canada.

In Europe Hemp is always strong in the fibre, in proportion to the richness of the soil in which it has been grown: it is therefore probable, that the same circumstance will take place in India, and that the Hemp of the richest land there will be the only kind fit for the Europe market.

Letter from Mr. Fawkener, Secretary to the Lords of Trade, to the Court of Directors, 4th Feb. 1803.

Hemp requires a soft soil, easily brought into fine tilth, rather light, but very fertile, and well manured and improved. Dry lands are not fit for Hemp: it does not rise well in them, but remains short and stinted

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in its growth; and its fibres are then generally too woody, which renders them hard and elastic; and all these are considerable defects, even for the coarsest works.

It is however true, that in rainy years it generally succeeds better on dry grounds than on moist: but as such years are not the most common, the best situation for a Hemp-ground is generally thought to be along the side of a stream, or of a ditch so full of water, that the water may constantly be nearly on a level with the surface, but without overflowing it. In some of the provinces of France such lands are called *Courties* or *Courtils*, and are highly esteemed by the cultivators of Hemp.

Du Hamel.

BENGAL.

HEMP-PROPER—*Cannabis Sativa.*

SOIL.

Hemp must always be dearer than any cordage used by the natives of Bengal, as it requires a much higher, richer soil, than the plants which they use for cordage.

Mr. Fleming.

Hemp must be sown on a rich free soil.

Mr. Douglas,—Board of Trade Cons. 5th May, 1801.

Hemp, *Cannabis Sativa*, will not grow but in a very rich soil; and the small spots about the habitations of the natives are best adapted to the growth of it, being in general well cultivated, manured, and of a dry, deep soil.

Board of Trade's Minutes, 5th May, 1801.

SOONAMOOKY.—The Resident says, he has seen Ganja, *Cannabis sativa*, grow luxuriantly on a sandy soil, manured with dung from the stables. This happened on his own grounds; the horses had been there from February. It was pulled up in July, and thrown away; the plants were six feet high. He nevertheless thinks this observation too slight to warrant the attempting to raise Ganja on a poor soil.

Board of Trade Cons. 12*th June*, 1801.

The seed should be sown on elevated spots of rich loamy soil, such as the Riotts cultivate tobacco, sunn, and paut on, near their habitations. In situations of this sort it thrives well and will be easily attended to.

Dr. Roxburgh's Essay.—Bengal Board of Trade Cons. 12*th Sept.* 1801.

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SUNN.

THE SOIL BEST ADAPTED TO ITS GROWTH.

At BENARES.—Light sand and clay mixed, such as barley and wheat are grown on.

COMMERCOLLY.—A dry black soil without any mixture of sand.

HURRIAUL.—Nearly an equal proportion of clay and sand, and on which water does not settle for any length of time.

HURRIPAUL.—A mixture of light clay and light earth.

KEERPOY.—Dry rich ground.

MALDA.—A mixed soil of sand and mould. It will not thrive in ground that is very sandy, nor does it succeed in clay without a mixture of sand.

RUNGPORE.—A fine soft mould, the richer the better. A dry tenaceous soil, or a cold clay, are equally improper. The lands in this district

district lying low, the highest are preferred. It is supposed to thrive best on ground just sufficiently high to prevent its being flooded.

Bengal Board of Trade Cons. 24th Aug. 1792.

DACCA DISTRICT.

BAZETPORE.—Dry and level grounds, where the rains do not settle, and where the soil is of a mixed kind, consisting of sand and earth.

TEETBADDY.—A mixture of sand and earth.

CHAUNPORE.—High ground, the banks of rivers or nullas, where the rains do not settle.

SERAMPORE.—Sloping ground, which is dry in the month of October.

SONARGONG—Produced only a small quantity on the banks of rivers.

DUMROY.—No Hemp is grown, the country being low.

SYLHET.—The borders of rivers, on ground adjoining embankments, and deserted land, on which habitations have been built.

JUNGYPORE.—A dry soil, such as is esteemed poor land in Bengal. To the westward it is grown on high raised banks of tanks. It will succeed on grounds which are incapable of bearing any other crop. It cannot bear being overflowed with rain; and one crop entirely exhausts the soil on which it is planted, so that it must lie fallow at least a year.

The lands to the westward of Cossimbazar River are generally of a stiff soil, inclining somewhat to clay, especially the higher lands. It is likewise produced on low rich soils, such as are not liable to be flooded; but it is not very common to raise it on such lands, as they

are

are capable of yielding more productive crops. The Ghore-Sunn, produced on rich land, is of a coarser and worse quality, than of high dry situations.

The Hemp in Europe requires a rich, deep, moist soil, and cannot bear strong clayey land: on the contrary, the Ghore-Sunn affects a dry, hungry, stiff soil, tending to clay; and although it will grow in rich deep soils, yet the Hemp (Sunn) produced in such situations is coarser than that from more dry and poor lands.

KEERPOY.—Kolla land, somewhat sandy.

PATNA.—A light, clayey, dry soil, neither high nor low, nor liable to be flooded.

CHITTAGONG.—A rich, light soil, near the banks of rivers and nullahs.

Board of Trade Cons. 14th January, 1793.

Sunn will grow in every soil and situation, except in very low places, where it is apt to be much overflowed in heavy rains, which circumstance would both impede its growth and injure the fibre.

Mr. Douglas, Board of Trade Consult. 5th May, 1801.

COMMERCOLLY.—The ground for Phool-Sunn is good Paddy or Mulberry land. For Boggy-Sunn rather high ground is chosen.

Board of Trade Consult. 12th June, 1801.

JUNGYPORE.—Sunn has this singular and invaluable property, that it can be raised on land so sterile as to be hardly fit for any other crop.

Board of Trade Consult. 23d June, 1801.

SOONAMOOKY.—Sunn requires a light rich soil, and thrives best on the most manured grounds.

The Resident states, that Mr. Douglas's observations of the soil requisite for Sunn, differ from the information he has obtained; but from Mr. Douglas's experience his opinion may be preferable. The Resident has

has never seen any land in cultivation for Sunn except in patches; in many instances it is broken up when the plant is about eighteen inches high, and left to rot on the ground as a manure for sugar-cane, and the cheapest that could be procured at a distance from the villages.

Board of Trade Consult. 17th July, 1801.

MALDA.—Only the high spots are at present sown.

Board of Trade Consult. 11th Sept., 1801.

CUTTORAH.—The soil is well suited to the plant. At HURRIPAUL it is different; the lands, being low, stint the growth.

Board of Trade Consult. 7th Oct. 1801.

LUCKYPORE.—The land in this district is too low and wet for Sunn.

Board of Trade Consult. 16th Oct. 1801.

HEMP,

MODE OF CULTIVATION.

THE first and most considerable ploughing or stirring is given to the Hemp-ground in the months of December and January, and is called the winter-ploughing or stirring. Some use for this purpose the common plough, laying the ground rough in furrows: others use the vineyard-hoe, likewise forming furrows, that the ground may be the better mellowed by the winter's frost. Some even dig it with the spade, which is certainly the best method, but more tedious and laborious; while, on the contrary, ploughing it is the most expeditious, but the least profitable.

In the spring, the ground is thoroughly prepared for the receiving of the seed by two or three ploughings or stirrings; and a fortnight or three weeks should intervene between each of these ploughings, making them gradually slighter, and laying the ground smooth and even.

In these spring-stirrings, as in the winter one, either the plough, hoe, or spade may be used.

If, after all these ploughings or stirrings, any lumps or clods of earth remain, they should be broken by the hand with mallets; for the whole Hemp-ground should be as level, and of as fine mould, as the beds of a garden.

All the manures that render the earth light are proper for Hemp; and accordingly the dung of horses, sheep, pigeons, and poultry, or the scowering of the ponds in villages, when it has had time to ripen, are preferable to cow-dung. Marle is not, to my knowledge, used for the manuring of Hemp-grounds.

It is best to dung the Hemp-ground every year, and before the winter-ploughing, that the dung may have time to rot during that season,

and

and that the spring-ploughings may the more thoroughly mix it with the earth.

Pigeons'-dung is the only one which, in order to derive the greater advantage from it, is put in the ground during the spring-ploughings. It is to be feared, however, that, if the spring proves dry, the pigeons'-dung may burn the seed, which it would not do, if laid on during the winter: but in this case, a greater quantity of dung should be used, or less advantage must be expected from it.

As soon as the Hemp-seed is sown, it must be carefully covered with earth; either by means of a harrow, if the ground has been ploughed; or with a rake, if it has been dug by hand.

Notwithstanding this precaution, the Hemp-ground must be constantly and assiduously watched, till the whole of the seed has risen; for otherwise numbers of birds, and especially pigeons, will destroy it entirely, without sparing even the seeds which have been well buried. It is true, that pigeons and birds which do not scratch, do no great hurt to the grains of corn that are well covered with earth: but the husks of these grains do not rise up out of the ground with their green shoots, as those of Hemp always do; and then it is, that these birds, mistaking them for perfect seeds, tear them away with the young plants to which they adhere, and thereby commit vast havock.

The farmers endeavour to frighten the birds away with scare-crows, and cause their children to watch the Hemp-grounds. But these precautions are found to be insufficient; for this is a very laborious task when the Hemp-grounds are large, especially if the pigeons, which are so greedy after it, be hungry. I have seen strong men, and even dogs, so wearied out with fatigue, as to be forced to give up the task. Happily, this troublesome work does not last long; for when the Hemp has put forth a few leaves, it requires no further tending.

After the plants have come up, the Hemp-grounds require very lit-

tle

tle care or labour till the gathering of the produce. In general, it is deemed sufficient to keep the ditches in order, and to prevent the cattle from entering them.

In very dry seasons, however, some industrious farmers water their Hemp-grounds by the hand: but this is not practicable, unless the grounds be small, and the water be near at hand; or they may be watered by immersion or overflowing, as I believe is done in some places.

If, by any accident, the Hemp grows very thin, so as to be thereby in danger of branching out too much, and becoming woody and incapable of furnishing good fibres, it will be adviseable to keep it perfectly clear of weeds, in order to let it remain for seed, which will be so much the better for the plants having stood thin; and thus, at least, some advantage will, in such cases, be derived from the hemp-grounds.

Du Hamel.

Some people give the land only one ploughing for Hemp, which is just before they sow it: but others prepare it as finely as the gardeners do their mould. For this purpose it should be ploughed once in the preceding autumn, and two or three times in the spring; and after the first spring-ploughing in February it should be well manured.

Chambers's Dictionary.

The ground on which Hemp is designed to be sown, should be well ploughed, and made very fine by harrowing.

Encyclopædia Britannica.

After you have made choice of your ground, break up about the beginning of May, in a fair season, with a strong plough, such as is generally used in all strong clay grounds, the share being rather long than broad, and the coulter rather somewhat bending than straight and even, according as the nature of your ground shall require, which you will soon find out on turning up two or three furrows; for, according to the cutting of the earth, you must fashion the temper of your plough.

To

To plough your land well, you must throw down your furrows flat, and betwixt every furrow you should leave a baulk of earth, half as broad as the furrow, and so go over the whole of the ground, without making any difference or distinction of lands. But if you fear any annoyance of water, then you should lay your furrows higher, nearer, and closer together, dividing the ground into several lands, and proportioning every land to lie the highest in the middle, so that the water may have a descent or passage on each side.

The ground where you sow your Hemp should be like that where you sow barley, or at least as often broken up as you do when you fallow for wheat, which is thrice; except it be some very mellow and ripe mould, as hemp-lands usually are; and then twice breaking-up is sufficient, which must be done about the latter end of February, and the latter end of April.

Seasonable Advice for England's Improvement, 1691.

Hemp should be sown after a fallow or green crop; and as this plant is of a vigorous growth, it must be laid down with manure plentifully. It ought to be ploughed deep before winter, and frequently in the spring, that it may be mouldered as much as possible before sowing.

Sinclair.

In Suffolk, Hemp is in the hands of both farmers and cottagers; but it is very rare to see more than five or six acres in the occupation of any one man. With cottagers, the more common method is to sow it every year on the same land. There is a piece at Hoxne which has been under this crop for seventy successive years. They manure for it with great attention; so that it may be taken as a maxim, that Hemp is not often sown without this preparation. Of dung and moulds it requires

twenty-five three-horse loads for an acre: of dung alone, sixteen are sufficient. This is done directly after wheat-sowing is finished.

The tillage consists in three earths, with harrowing sufficient to make the soil perfectly fine; and it is laid flat, with as few furrows as possible.

The Rev. Mr. Mills, of Bury, observes, that the land should be well worked, and manured with thirty loads per acre, about a fortnight before seed-time.

Hemp may be grown with success on the same land many years by manuring annually.

Suffolk Report.

At Swineshead, in Lincolnshire, where much Hemp is grown, it was formerly cultivated on the same spots year after year; but now they spread it over a farm, accordingly as the soil suits or the price actuates; and on some lands that are foul, they sow it as a cleanser. If the soil is weak, they manure for it. It is ploughed first at Candlemas; a second time at Lady-day; and a third time about the middle or end of May, previous to sowing.

At Haxey it is sown after wheat. Some plough before Christmas; others at Candlemas. After the first ploughing, the ground is manured. Some turn it in; but this is not so good. A middling dressing, the shorter the better. The best dressing is pigeon's-dung, added to dung, a quarter, or a quarter and a half per acre. It answers best after wheat that follows clover. The ground should be ploughed again between Candlemas and Lady-day, three or four times, and well rolled and harrowed.

Lincoln Report.

Dung is by no means necessary to the growth of Hemp; but good tillage

tillage and a suitable soil is absolutely so. The mould should be deep and easily penetrated; for the fibres of the roots are soon checked, and, if impeded, are no longer capable of performing their proper offices.

Complete English Farmer.

In the northern parts of Europe, as Poland, Prussia, and Russia, the most infallible mode of ascertaining when the soil is of a proper degree of strength, is by raising previous crops of other grain.

On a vigorous soil, in a good state of cultivation, the usual rotation of crops is: 1st Winter-wheat; 2d Winter-rye; 3d Barley; 4th Oats; and then Hemp. Such a soil will bear a crop of Hemp without being manured: if manured after the first, it will give a second. But on a soil of less strength, a crop of Hemp is taken immediately after the winter-crop of rye; the land being ploughed up once, either in the intervening autumn or spring, harrowed and manured in the spring, and then ploughed over a second time for sowing.

To make the most of this poor soil, a winter-crop of rye is sown immediately after the Hemp has been drawn, without any further manure.

Durno.

Land intended for a crop of Hemp must be well manured, well ploughed, cleansed, and gotten fine.

L'Abbé Brulles.

Hemp-grounds must be dunged every year; and the better to secure success, it would be proper to lay on the dung before the winter-tillage, that it may waste itself there, and mix the more perfectly with the ground, which, impregnated with these new salts, will derive the greater advantages from the influences of that season, and catch more

of

of the volatile salts of the air, that commonly abound most in the winter.

Of all the sorts of dung that are used for Hemp-grounds, pigeon's-dung only, or any other kind of dung that is fully ripe, ought to be laid on before the last labour, as is practised with success in several places. In countries where the land is strong, they generally lay it in heaps after autumn. In this manner it becomes more free and light than when it is only tilled. The snow and rains which penetrate it in the winter-time, and the frosts that are common in that season, kill, if we may so express it, that ground, as they would a chalk-stone, and make it so free, that in the month of February nothing more is wanting but to lay it level, by a quick and easy labour. All its parts, and even the most tender particles, will then be found extremely small, light, and lively.

But different soils require different methods of preparation; and it is the part of men of understanding to discontinue bad customs, that have prevailed till this time, and substitute better methods in their place.

Marcandier.

The ground should be made rich with dung, and for the conveniency of pulling the male or early Hemp (without hurting the other,) as well as giving it air, I would sow it in drills, or small ridges, about three feet broad, with two feet intervening between the ridges; that a person may go up and down amongst it, without trampling upon the seed-hemp.

It grows best when sown repeatedly on the same ground, provided it be well dunged every three years.

M'Donald's Essay.

If the ground has not had a previous summer fallow, it should be ploughed

ploughed once in the autumn and twice in the spring: it should then be harrowed extremely fine with iron-toothed harrows.

Taylor's Instructions.

MODE OF CULTIVATION IN BENGAL.

Instead of sowing the Hemp *(Cannabis sativa)* very thick, as it ought to be done when the plant is intended for cordage, the natives sow it very thin, and afterwards transplant the young plants, placing them at a considerable distance from each other, often nine or ten feet. By this mode the plant grows to a very large size, a great deal too large to admit of the stalks being properly bruised for heckling. This mode of cultivation is too expensive, if used with the view of preparing cordage from the plant.

There can be no doubt, that the Riotts, if due encouragement were held out to them, would readily adopt the European mode of cultivating the Hemp, and also of dressing the fibre for cordage. A native, who had an opportunity of observing the mode of cultivating and preparing the Hemp raised by Mr. Douglas at Rishera, has offered to the Board of Trade to contract with them for supplying a very considerable quantity, I believe five hundred maunds*, of properly dressed Hemp next season, at the rate of ten Sicca rupees per maund.†

Dressed Hemp might probably be soon procured at eight Sicca rupees

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* About seventeen tons.

† This is equal to 300 Sicca rupees, or, at 2s. 6d. per rupee, £35. per ton.

rupees per maund, or £28 per ton, but hardly at a lower rate, at least for some time.

When the mode of cultivation is better known, and the Riotts find they have a certain market for their produce, it is probable they may be able to afford the dressed Hemp at a much lower price.

The ground must be manured, and repeatedly ploughed and harrowed.

Mr. Fleming.

The seeds should be sown as thick as the natives commonly sow the Sunn, on a rich free soil. The ground should be well manured, and repeatedly well ploughed and harrowed.

Mr. Douglas.

The mode of cultivation practised by the natives differs materially from that requisite for the purpose of raising Hemp; and they are notoriously wedded to their own customs and habits, and averse to innovation of any kind.

Minute of the Board of Trade.—Board of Trade Cons. 5th May, 1801.

SUNN.

BENARES.—The ground is ploughed over once or twice in the month of June, or at the commencement of the rains, and when it is thus prepared and moist, the farmer watches an opportunity, when he thinks it likely to be fair clear weather for a few days, to put the seed into the ground. If in this he is not disappointed, the young plant will begin to make its appearance in three or four days after the seed has been sown, and it will afterwards require but little attention, as the usual rains, without any other assistance, are sufficient to bring it to maturity. But should the farmer be not successful at the time of putting the seed into the ground,

ground, and heavy rains come on, before it has had time to take root, the consequence is, that it will rot, and he has lost his labour. At the close of the rains, or about the end of September, the Sunn is ready for cutting. When the farmer is cutting it, he will leave standing a small quantity, perhaps about a quarter of a begah out of ten begahs, to grow to seed; and that is cut about the end of October. Afterwards he will prepare the same ground for barley, wheat, or some other grain, but in general the two former, and thereby have two crops from the same ground, between the month of June and the middle of March.

MALDA.—In the month of September, the ground must be first of all twice ploughed and then once harrowed; after which it must be again twice ploughed and once harrowed; all the clods of earth beat fine, and well cleared of weeds. In this state it is ready to receive the seed. After sowing it must be twice ploughed and twice harrowed. This is the practice with ground which has been recently in cultivation with other articles; but in case the land to be cultivated has lain fallow during several years, more labour must be bestowed upon it, and instead of being ploughed six times it must be ploughed ten times.

Such is the mode of cultivation generally practised in the different districts round the factory: but in the country adjacent the seasons of sowing and reaping are quite different, and the cultivation is performed after the following manner:

The ground being prepared, as before, with four or more ploughings, as circumstances require, and being well cleared of weeds, the seed is sown in *Jeyse Assar* (June), after a fall of rain, and the ground must upon this be ploughed and harrowed. When the plant has grown about nine inches from the ground, it must be weeded. It must again be weeded when the plant is a foot and a half, or two feet high. The Sunn being ready, which happens in *Bhaddar Assee* (September), is

cut

cut down, and not pulled up by the roots, because from growing in the rainy season the stalks are much larger and stronger. Some cut it in flower, some in seed. The Sunn being cut is left three or four days in the field, during which time the greater part of the leaves drop off. The last mentioned Sunn, which is cut in September, is both finer and stronger than the other.

COMMERCOLLY.—There are two kinds of Sunn, which are cultivated at different seasons of the year, though they are nearly similar in quality; one being sown in June, the other in October. That sown in June is generally cut about August, and the other about April. The plant intended for seed is left standing fifteen or twenty days longer, when it is cut, and, after being thoroughly dried, the seed is taken from it by threshing.

HURRIAUL.—In the month of January the ground is ploughed and harrowed: in February it is again ploughed. In April, after the first shower of rain falls, it is a third time ploughed and well harrowed, to clear it from weeds, and the following day the seed is sown by the hand (in the same manner as the English farmers do wheat, &c.) and then again well harrowed. In a few days it appears above ground. When it has got to the height of about eighteen inches, the ground must be well weeded; after which nothing further is required to be done until the month of August, by which period it is at its full growth (about five feet), and the flowers make their appearance. It is then (except what is intended to be reserved for seed) cut down, as close to the ground as possible, and laid in ridges, care being taken to place them so, that the leafy parts lie one upon the other. In this state they continue ten or twelve days, or until the leaves begin to rot, and fall from the stalks on being shook.

HURRIPAUL.—

HURRIPAUL.—It should be raised on high ground, where no water will lie. First, dung is thrown upon the earth; after lying ten days, it is ploughed; five days afterwards it is harrowed once; in two days more the seed is generally sown. The sowing never should be delayed beyond seven days. After strewing the seed, it is ploughed and harrowed. In three days the seed will begin to shoot, and appear plainly in four or five. No further process is required, not even weeding; the Sunn being set so close, and growing so thick, that nothing else can easily come up. In a month and a half it will be seven feet and a half or eight feet high, at which time it bears a yellow flower. At this time it is cut down, except what may be left for seed, the fibre from which will be inferior. The season begins about the 10th May, and the crop is gathered within two months. If sown every year in the same spot, the soil would be impoverished, and the produce inferior; the land is, therefore, every other year, appropriated to sugar, cotton, or early grain.

RUNGPORE.—About the month of March the cultivation of the land commences. It is frequently ploughed, cleaned, manured, and ploughed again for the space of a month; the soil being well mixed, broken fine, and laid smooth. The seed is strewed over the ground lightly in the month of April. In about eight or ten days the plants begin to rise. About fifteen or twenty days after, the ground is carefully weeded. When the plants have risen to the height of a haut, or half a yard, those which may have sprung up too close to each-other are transplanted to more open parts of the field. When they have risen to the height of one and a half or two hauts, the ground is again weeded; after which they are left to ripen, without further care. In about four months from the time of sowing, the plants will have arrived at maturity, at which time their height will be about five hauts. Those plants which are reserved for seed are generally allowed to remain a few days longer

on the ground than the rest, till the seed begins to loosen in the husks.

Board of Trade Cons. 24th August, 1792.

DACCA DISTRICT.

BAZETPORE.—If the ground has lain waste any length of time, it will require to be many times ploughed, previously to the reception of the seed, which is sown in Cautic (October): but if the ground be already in a state of cultivation, and has lately yielded an ouze crop of grain, it will be sufficient to plough it four or five times.

After the plants appear, the only care that is taken, is to place Chokeys, to prevent cattle from injuring them.

About five months after the plants come up, on their being sufficiently mature, they are taken up by the roots, and tied up in bundles.

DACCA-JELALPORE.—The ground is ploughed seven or eight times, and the seed sown in Cautic and Augun (October and November).

When the seed is sown, the plants appear in the course of ten or twelve days, after which no further care is bestowed upon them. Three months afterwards the plants are cut down.

TEETBADDY.—The ground should be plouged five or six times, and the seed sown in Cautic (October), or until the 4th or 5th Augun (15th November).

After the appearance of the plants no further care is bestowed on them.

About four months after the appearance of the plants, or in the months Faugun and Chyte (February and March), they are taken up by the roots, and, the tops being taken off, are tied into bundles.

MOMENSING.

MOMENSING.—If the ground has been previously cultivated, three or four times ploughing is a sufficient preparation for the reception of the seed, which is sown in Cautic (October).

From the coming up of the plants, until the time of harvest, no farther attention is given to them.

The plants blossom in Maug or Faugun (January or February), and after blossoming they are cut down.

CHAUNDPORE.—The ground should be ploughed and harrowed seven times, and the seed sown in Cautic or Augun (October, November). After the seed comes up, the plants are reared in the same manner as at Teetbaddy.

Five or six months after the coming up of the plants, in Faugun or Chyte (February, March), on the falling of the blossoms, the plants are taken up by the roots, and tied together in small bundles.

SERAMPORE.—If the ground be already in a state of cultivation, it will only require to be ploughed three, and harrowed four times, previously to the sowing of the seed, which should be in Augun or Poose (November, December), and to be twice ploughed, and three times harrowed, after the sowing: but if the ground have lain waste any length of time, the ploughing and harrowing must be repeated oftener.

After the seed comes up, the plants are reared in the same manner as at Teetbaddy.

Seed sown in Augun (November) produces plants which are cut in Faugun (February). Seed sown in Poose (December) produces plants which are cut in Chyte (March). On cutting the plants, the tops are separated and thrown away.

TIPPERAH.—Previously to the sowing of the seed, which is done in Cautic (October), the ground is ploughed three or four times, and harrowed.

After

After the seed comes up no further trouble is taken.

In five or six months after sowing the seed, or in Chyte and Bysaak (March and April), the plants are cut down, and made up into small bundles.

SYLHET.—The ground is ploughed twice, and the seed sown in Cautic (October.)—After the appearance of the plants, no further attention to them is necessary. In Faugun or Chyte (February or March) about four months after the sowing of the seed, the plants are cut down, and made up into bundles.

JUNGYPORE.—The ground designed for Ghore-Sunn is ploughed three or four times, and the clods of earth are broken and pulverized by a kind of harrow. The lands are ploughed twice in the dry season, in April or May. When the rains set in, they are again ploughed, and the seed sown when the land is as wet as the situation will admit.

The plants appear four or five days after the seed is sown, and, rising very quickly, require no weeding, as the plant soon overtops and destroys grass or weeds, by depriving them of nourishment: and as the seed is sown on the commencement of the rains, no watering is requisite, nor any thing further to be done by the proprietor, until the plant is ready for cutting, which is from the 20th of September to the 10th of October, being sown in all June. The plant is cut when in flower, and bound up into bundles.

KEERPOY.—The ground being ploughed three different times, the seed is sown, by being scattered over the ground at pleasure, with the hand, in the month of Bysaak (April); and in Ausseen (September) the Hemp is cut.

PATNA.—The only preparation required for Sunn is to plough the ground four times transversely, after manuring it with wood-ashes and cow-dung, in equal quantities, in the proportion of about eighty pounds

pounds to a cottah, or square of about nine feet. The seed is sown in June, soon after the setting in of the rains. The ground must be kept free from weeds.

It grows six or seven feet high, and is cut down in November, about the time it begins to flower; and what is reserved for seed, is ripe and cut in January and February.

CHITTAGONG.—The time for sowing the Ghore-Sunn, is in the month of Ausseen (or September). Previous to its being sown, the ground is well manured with ashes, and ploughed, and then harrowed for nine or ten days together, until it is made as fine as garden-mould. This done, the seed is thrown into the ground, or laid in rows, as fancy may direct, covering it over lightly with earth.

When the plant appears, which is generally in five or six days, it is frequently hoed, and kept free from weeds; and when it comes to maturity, which will be in about four or five months, it is pulled up by the roots, and tied up in small bundles.

Board of Trade Cons. 14*th Jan.*, 1793.

In the cultivation of Sunn, the natives seldom pay much attention to the quality and tillage of the land, it being a plant that will grow in almost every soil and situation; except in very low places, where it is apt to be much overflowed in heavy rains.

Mr. Douglas, Bengal Consult. 5*th May*, 1801.

CHITTAGONG.—Sunn is cultivated and prepared in the manner stated by Mr. Douglas to be common in the other parts of Bengal.

COMMERCOLLY.—The ground is good paddy or mulberry land, and should be twice well tilled for Phool-Sunn, and once for Boggy.

Board of Trade Cons. 12*th June*, 1801.

BOMBAY.

Mode of Cultivation.

A good deal of Hemp (*Crotolaria*) is annually cultivated in Salsette. It is generally sown on the sides of hills, as it would not pay for the expence of better ground. Its cultivation costs but little; the ground is slightly scratched by an instrument, when the seed is sown, towards the end of the rainy season. It grows luxuriantly, without further trouble, to the height of seven or eight feet, or more; and soon after the conclusion of the rainy season it is ripe.

There are vast tracts of mountainous ground in Salsette, where Hemp would grow to perfection; and there is also much uncultivated low land, on which it could be raised without interfering with the present agriculture of the country. It might be proper to let the people have such land as is employed in this cultivation free from rent. This encouragement, I think, would have the desired effect in the course of a few years; but I cannot suppose, that the people of that island will pay for the land, in order to cultivate Hemp, or that they will raise any quantity of it, which they do not see they can immediately dispose of to some advantage.

Letter from Dr. Helenus Scott, 31*st May*, 1803.

HEMP-SEED,

HOW TO ASCERTAIN ITS BEING OF A GOOD QUALITY.

WHEN good, it will not break on being rubbed. It should be always of the growth of the preceding year, and every second or third year taken from a different soil.

Chambers's Dictionary.

In the choice of the seed, the heaviest and brightest-coloured should be preferred, and particular care should be had as to the kernel of the seed. For the greater certainty in this matter, some of the seeds should be cracked, to see whether they have the germ or future plant perfect; for in some places the male plants are drawn too soon, *i. e.* before they have impregnated the female plants with the farina: in which case, though the seeds produced by these females may seem fair to the eye; yet they will not grow, according to the doctrine of Linnæus.

Encyclopædia Britannica.

Fresh seed should be chosen, of a bright colour, and so firm, as to bear being well rubbed betwixt the hands, which renders it brighter. There is no mark of the sex discernible in the seed.

As the degeneracy of plants, and their disagreeing with the soil and climate, are discovered by the degeneracy of the seed, which in Hemp and Flax will be observed by their becoming more elongated and less plump; improvements in that event may be made, by transferring the seed produced in one district to another of a different soil; and, as in Hindoostan there is such a variety of climate and soil, at distances not remote from each other, experiments may be made there with

with more success than in Europe. This deserves particular attention; for, it is said, that the Dutch import all their Flax-seed from Riga, and that Russia, on the other hand, provides herself with seed from Holland.

Sinclair.

The best seed for Hemp is the smoothest, roundest, and brightest, with the least dust in it.

England's Improvement.

There is great nicety required in the choice of the seed, and much is sold that is good for little. The method by which those who are conversant in Hemp-seed judge of its goodness, is by its weight, its colour, and its gloss. If it is heavy, bright, and of an oily-like glossiness, there is no doubt of its goodness, provided that no mixture is found amongst it. What is most to be apprehended, is from a mixture of immature seed, which has all the appearance of good seed, but has never been properly impregnated: for, as Hemp is male and female, one bearing the farina, the other the seed; and as the male is ripe much sooner than the other, it frequently happens, that the male is pulled before the seed of the female is properly fecundated: in which case, though the seed is in appearance perfect, yet it is only a mere husk, without any prolific powers. The seed, however, that comes from the Baltic, provided it is fresh, is generally good: but the dealers are very apt to mix it, or to push off their old seed upon those by whom they cannot be detected.

Complete English Farmer.

To have good seed, you must use the produce of the last crop, and the grain must be clean and full-grown. Seed of two years' growth will not be so good; that of three years' standing will be still less valuable, and oftentimes will not spring up at all.

Marcandier.

The seed to be sown should be new.

Abbé Brulles.

The Hemp-seed that is sown should always be of the growth of the preceding year; because, as it is an oily grain, it is apt to become rancid, if kept too long: in which case it loses its vegetative power, insomuch, that when it is two years old, many of the grains will not rise at all; and if it be older, a still less quantity will grow.

Du Hamel.

Mills, in his Practical Husbandry, in addition to what is said by Du Hamel as above, remarks: "Experience has also proved, that in "this, as in other grain, it is adviseable, every second or third year, to "choose the seed from a soil different from that in which it is to be sown."

Much care should be taken in the choice of Hemp-seed. That of the last year's growth should be chosen, and such as has not been heated in the carriage. Choose such seed as appears fresh, firm, and bright. Prove it by rubbing it between your hands: if it suffers this without breaking, and becomes brighter, it is a good sign; but if it be broken and made dusty by rubbing, it is unfit for the farmer's use.

Whatever seed is sent from England should be packed in small casks, and great care taken to procure that which is new and of the best quality; before it is depended upon for a crop, a small quantity should be sown in good earth, in a warm secured situation, to see that it will vegetate. It has been supposed, that keeping Hemp-seed in a cellar, two or three weeks previous to its being sown, will assist its vegetation.

Taylor's Instructions.

Hemp-seed, if sent to India, should, during the passage, be kept in a cool, dry, airy place; for if put into the Hold or Bread-room, the seed, from its oily nature, will become rancid and unfit for vegetation. A large quantity of the best English Hemp-Seed was sent to me about two years ago by Sir Joseph Banks: it had been kept in the ship's Hold in the way out, and not one seed grew.

Dr. Roxburgh—Bengal Cons. 12th February, 1801.

If seed is obtained as soon as thrashed out of the straw, and packed in small bags of Osnaburgh, or some other thin linen cloth, each bag to contain not more than a bushel, such bags may be stowed in the stern-gallery or some other airy part of a ship; and as it is impossible that the seed can heat under such circumstances it is apprehended that the large part, if not the whole of it will retain its vegetative powers till its arrival in India.

Letter from Mr. Fawkener to the Court of Directors, 4th February, 1803.

BENGAL. SUNN.

BENARES.—The seed will not keep beyond a season.

Board of Trade Cons. 25th May, 1802.

HEMP-SEED,

THE QUANTITY REQUIRED TO BE SOWN.

THREE bushels of seed are the general allowance per acre; but the richer the land is, the thicker it should be sown, and *vice versa.*

Chambers's Dictionary.

About three bushels is the usual allowance for an acre.

Encyclopædia Britannica.

A bushel and a half will answer for an acre, if sowed in drills.

Sinclair.

Eleven pecks per acre, at the price of from one to two shillings per peck; generally from sixteen to eighteen pence. Much is brought from Downham and the Fens.

Suffolk Report.

From

From nine to twelve pecks per acre, varying with the strength of the soil and the custom of the country. In those places where the finest and best Hemps are grown, twelve pecks is a common quantity.

A Stowmarket Manufacturer, in Suffolk Report.

Three bushels and a half of good bright seed are sufficient for an acre.

Rev. Mr. Mills, in Suffolk Report.

At Swineshead: Three bushels per acre.—At Haxey: Ten pecks a chain-acre.

Lincoln Report.

Not less than three or four bushels to an acre.

English Farmer.

Three bushels to an acre.

Mills's Husbandry.

The seed ought always to be sown thin, not exceeding two bushels to an acre; and if you have the advantage of a drill plough, still less will do.

Abbé Brulles.

Hemp-seed should be sown at the rate of fourteen pecks per acre.

M'Donald's Essay.

If sown broad-cast, two bushels of seed for an arpent, or four-fifths of a statute acre.

Taylor's Instructions.

BENGAL.

SUNN.

BENARES.—For one begah twenty seers of seed, which, at four begahs per acre, according to the Resident's computation of the begah in Benares, make two maunds per acre.

COMMERCOLLY.—

COMMERCOLLY.—The quantity of seed required to sow a begah of land is computed to be thirty seers of sixty Sicca-weight. The Resident does not state the number of begahs which go to an acre in his Aurung; it may be pretty generally estimated in Bengal at three begahs to the acre. Ninety seers, or two maunds ten seers of seed, will therefore be required to sow an acre.

HURRIAUL.—Upon an average, if the seed is good, eighteen seers are sufficient to sow an acre.

HURRIPAUL.—Estimating an acre at three begahs, which is near the mark, it would require thirty-nine seers, Factory weight, per acre, the seed being sown very thick.

MALDA.—The Resident received various reports from different places on this point. In some they sow a less, in others a larger quantity of seed, and the two extremes are very wide of each other. To the northward, in the district of Malduar, near the hills, they sow one maund five seers per acre: lower down, one maund twenty seers: to the eastward, about Buddaul, three maunds thirty-six seers: in this vicinity, three maunds. I have compared the seed obtained from these different quarters, and can perceive hardly any, if any, difference in the size of it. It is difficult, therefore, to determine what may be the precise cause of this variation in the quantity of seed sown in those places. The thicker the Sunn grows, the better; the stalks then shoot up straight, without throwing out branches, the fibres of which are short and much inferior to those of the principal stalks. The cultivators here say, the stalks of the Sunn should grow so thick, as to prevent the air from passing through them: and this may be the best criterion for determining the quantity of seed which an acre requires.

KEERPOY.—About sixty seers of seed for one acre.

RUNGPORE.—About twelve chittucks of seed are computed to be sufficient for sowing one begah, which in British weight and measurement may be reckoned about four pounds and a half avoirdupoise to an acre.

Bengal Board of Trade Cons. 24th Aug. 1792.

DACCA DISTRICT.

BAZETPORE.—The quantity of seed required for a begah is thirty seer.

TEETBADDY.—The quantity required for a begah is thirty seers pucka (of eighty Sicca-weight to the seer) per pauky or begah.

CHAUNDPORE.—One cauny of ground requires five maunds of seed: one cauny is equal to twenty nuls in length, and ten in breadth.*

SERAMPORE.—The quantity of seed required for one begah is one maund.

DACCA JELALPORE.—The quantity of seed required for one begah is thirty seers.

MOMENSING.—The quantity of seed required for a begah is one maund.

TIPPERAH.—In this country the land is not measured by begahs, but caunies and drones. The dimensions of a cauny are twelve nuls long and ten broad, each nul being sixteen hauts. One cauny, according to the usage of this district, is equal to four begahs sixteen cottahs. One cauny requires one maund seventeen seers and a half of seed: one begah, twelve and a half.

SYLHET.—The quantity of seed required for one begah is seven seers and a half.

JUNGYPORE.—The seed appropriated to one acre of 4840 square yards, is calculated to be 1 Factory maund, 9 seers, 8 chitticks. This quantity the Resident supposes to be far too much; but was informed, that the plant rising in a single slender stem would be laid by wind or rain, which is prevented by the stalks standing thick together, and mutually support-

* A Nul measures 14 hauts; a haut is half a yard.

ing each other. This is the reason assigned: but it is not satisfactory; as, if one half of the seed were sown, the plant would not be drawn up to so slender a stem, would have more room to strike down sufficient, and would resist the weather better than when sown so thick as is the present practice.

KEERPOY.—The estimated quantity of seed required to sow a begah is five seers.

PATNA.—A begah consists of twenty cottahs, and a cottah consists of a square of six cubits, or nine feet, on each side. One seer of seed is required to sow a cottah, or twenty seers for a begah.

The best Sunn is produced from stout and tall stems, and therefore the seed is scattered more abroad, about half a foot distant from each other.

CHITTAGONG.—One seer, or two pounds of seed, is sufficient for one cauny or begah of ground.*

Board of Trade Cons. 14th Jan. 1793.

RADNAGORE.—Each begah takes sixteen seers of seed.

Board of Trade Cons. 2d June, 1801.

COMMERCOLLY.—Thirty seers per begah of Phool-Sunn.

Twenty seers per begah of Boggy Sunn.

Board of Trade Cons. 12th June, 1801.

KEERPOY.———Twenty seers per begah.

Board of Trade Cons. 21st July, 1801.

* I suspect this to be an error. R. W.

HEMP-SEED,

THE PERIODS OF SOWING.

THE period for sowing Hemp is from the beginning to the end of April, and the best season is just after a gentle fall of rain.

Chambers's Dictionary.

The seed may be sown about the middle of April.

Encyclopædia Britannica.

It may be sown from the first week of April till near the end of May; but the sooner the better, both for the Hemp and the seed.

Sinclair.

The time of sowing is from the midde to the end of April; but it will bear being sown in all May. It is often found, that the early-sown seed yields Hemp of the best quality.

Suffolk Report.

The time of sowing is from the beginning to the end of April. If sown earlier, as the plants are almost as tender as French-beans, the frost would greatly injure, if not totally destroy, them. The sooner (the season permitting) it is sown, the better; though it has sometimes been deferred to the 15th of May.

Rev. Mr. Mills, in Suffolk Report.

It is sown about the middle or end of May.

Lincoln Report.

SERAMPORE MISSION INSTITUTE OF CULTURE LIBRARY CALCUTTA

The

The whole month of April is the proper season for sowing of Hemp.

Complete English Farmer.

In Russia, Prussia, Poland, &c. Flax and Hemp are generally sown at the same time, *viz.* between the 15th of May and the 10th of June.

Darno.

The season for sowing it begins not much before April, and does not last beyond the end of June. The diversity of soils in the same province, and the inconstancy of seasons, in France, occasion this difference: and so long a season for sowing is the more necessary, as it gives an opportunity to sow the same field a second or third time, when, by reason of various accidents, the first seed is lost. But, after all, the Hemp that is first sown, generally thrives best, and appears most beautiful, unless it is nipped by the frost, or spoiled by the heat, when it begins to spring and grow up. The day on which the plant springs, and a few that follow it, are generally most critical: but in a short time it acquires strength enough to bear all the cross accidents that can befal it. A little rain, before or after the Hemp is sown, turns much to its advantage.

Marcandier.

The season for sowing Hemp depends, in a great measure, on the quality of the soil. In dry light ground, it should be sown as soon as the danger of frost or other inclemency of the weather is over, in the latter end of April, or beginning of May, that so it may get up early, and by covering the ground prevent the danger of drought. In wet cold grounds, it should be sown later, that is to say, not till the sun has exhaled the too great moisture of those grounds; and this may not be till the middle, or even the latter end of May. The Author of an Account of Hemp in the Memoirs of the Royal Society of Agriculture

culture at Tours, advises to sow Hemp even so late as the latter end of June, in case the season for it be not favourable sooner; and he observes, that the crop sown then will be as plentiful, and of as good a quality, as if the sowing had not been delayed so long; especially if a very dry season does not come on immediately after. The truth of this is evinced by the experience of those who are obliged to sow a second, and sometimes a third crop, when their former sowing has miscarried, through the inclemency of the weather, and particularly of frost, which is a great enemy to Hemp. Another reason, too, which he assigns in favour of late sowing of Hemp, is, that the husbandman, by this means, is afforded an opportunity of destroying the first growth of weeds, which would choke the Hemp, if it were sown before they had come up.

Mills's Husbandry.

The season for sowing varies, according to the soil, weather, and convenience of the cultivator, extending from the 25th of March to the 15th of June.

Abbé Rullis.

Your ground being cultivated in autumn, will, by the winter frost, be ready to receive your seed by the latter end of March, or the beginning of April. The moon being on the wane, or declining, is a fit season to sow your seed.

England's Improvement.

Hemp should never be sown sooner than the beginning of April.

M'Donald's Essay.

The best time for sowing Hemp is between the 1st and 20th of May, according as the season is favourable. When it is sown, it should be carefully guarded against birds, till firmly rooted in the ground.

Taylor's Instructions.

The

The seed is sown in the month of May, by some cultivators a fortnight sooner than by others; and both incur different risks. Those who sow early, have to fear the spring-frosts, which are very hurtful to the plants newly sprung-up; and those who delay the sowing too long, have to fear the droughts, which sometimes prevent the Hemp-seed from vegetating or coming up.

Du Hamel.

BENGAL.

HEMP. *Cannabis sativa.*—TIME OF SOWING.

The season for sowing Hemp is from April to the beginning of June.

Mr. Fleming.—Bengal Cons. 5th May, 1801.

The seed should be sown about the beginning of the periodical rains; or earlier, if there have been frequent showers.

In many parts of Bengal, particularly where the land is so low as to remain humid through the dry weather season, Hemp thrives luxuriantly during the cold season: but the water is then too cold for macerating the plants to the greatest advantage. One day in June, July, or August, has more effect in loosening the bark, than eight in December, January, or February; consequently the prolonged immersion injures the quality of the Hemp much. The rainy season is, therefore, preferable for the cultivation and maceration, even if the plant grew better during the cold; which is by no means the case, particularly on lands elevated above the level of the annual inundation of the low rice-fields. We must, therefore, content ourselves with one crop in the year; for it is a very false notion, though a very prevailing one, that the fertile fields of Asia produce at least two crops annually*. As well might we say, that the

* The Resident of Malda speaks of two, and even three, crops of Sunn being produced in the year.

the fertile lands of England yield at least two, because a well-managed garden near London, or some other large city, will produce repeated crops in the year. So in India, by great care and industry, a spot here and there will produce two or more crops. The burning heats of Asia, while they last, are as unfavourable for vegetation, as the frosts of winter in Europe.

Dr. Roxburgh's Essay.—Board of Trade Cons. 12th Sept. 1801.

SUNN.

BENARES. - - - - Is sown about July.

HURRIPAUL. - - - - - - - - - the 10th of May.

COMMERCOLLY. - - - - - - { The Phool in June. / The Boggy in October.

HURRIAUL. - - - - - - - - - In April.

MALDA,

Round the Factory. - - October to middle of November.

In the adjacent Country. - - in June.

RUNGPORE. - - - - - - - - in April.

Board of Trade Cons. 24th Aug. 1792.

DACCA DISTRICT.

BAZETPORE. - - - - Is sown in October and November.

JELALPORE. - - - - - - - - October and November.

MOMENSING. - - - - - - - - October.

CHAUNDPORE. - - - - - - - - October and November.

SERAMPORE. - - - - - - - - November and December.

TIPPERAH. - - - - - - - - - October.

SYLHET. - - - - - - - - - - October and November.

JUNGYPORE. - - - - - - - - - all June.

KEERPOY.

KEERPOY. - - - - - Is sown in April.
PATNA. - - - - - - - - - - June.
CHITTAGONG. - - - - - - - April and May.

Bengal Board of Trade Cons. 14th Jan. 1793.

It is sown from the beginning of June to the end of July.

Mr. Fleming.

It is commonly sown from the commencement of the rainy season to the middle of July; after which it requires no further attention, till it is ready to be taken up.

I am informed, there is a variety of the *Crotolaria juncea* cultivated up the country, which is commonly sown in October and November, and is ready to take up in February and March. From the difference of season in which it is cultivated, it might be found to be of considerable advantage, both in respect to obtaining a greater quantity if required, and convenience of preparation; for, no dobut, the dry is much preferable to the wet season for that purpose.

Mr. Douglas, Bengal Cons. 5th May, 1801.

CHITTAGONG.—The Resident says, his predecessor stated in his letter of the 9th October, 1792, the season for sowing it to commence in October, and of reaping in March. But he finds it is not sown till from the end of September to all October, and the crop is gathered in all February.

In the upper provinces in Bengal, and throughout Bahar, he adds, he is informed, that the seed is sown in May, and the crop gathered in September. The cause of the difference in the time of cultivation he supposes to be, that the soil round Chittagong is too damp, and that during the periodical rains the face of the country is under water.

COMMERCOLLY.

COMMERCOLLY.—Phool-Sunn is sown from the beginning of November to the middle of December: it will not thrive, if sown at any other season.

Boggy-Sunn is sown from the 20th of May to the 20th of June: it will not thrive, if sown at any other period.

DACCA.—Sunn is never sown in Dacca earlier than in October.

RUNGPORE.—Sunn *(Crotolaria juncea)* is sown in October and November, and taken up in February and March. This season is the most favourable, on account of the convenience it affords for the preparation. There is no variety of it cultivated here.

Board of Trade Cons. 12th June, 1801.

LUCKYPORE.—Sunn is sown here from September to November, and gathered from February to April. The country is too low for its being grown in the rainy season.

Board of Trade Cons. 17th July, 1801.

MALDA.—In some of the Aurungs two crops are afforded in the year: one is sown in June and July, and cut in September; the other is sown in October and November, and cut in March and April. One person stated an instance of a third crop being produced. The September crop must always be small, owing to the annual inundation. The inundation helps the March and April crop, by fertilizing the land. This crop is the most productive, and the best in quality.

RUNGPORE.—The seed being sown here in October, and in most parts of Bengal in April, the Resident doubts whether the Rungpore seed would thrive in the other parts.

Board of Trade Cons. 11th September, 1801.

GOLAGORE.—The seed sown between the 20th of May and 15th of June is more productive than that sown a fortnight or three weeks later.

later. The latter flowers sooner, and grows to little more than half the height. The plant appears to be equally good.

Board of Trade Cons. 25th September, 1801.

COAST OF COROMANDEL.

In the Rajahmundy Circars, where a considerable quantity of Sunn is grown, the seed-time is at the close of the rains in October.

HEMP-SEED,

DIRECTIONS TO BE OBSERVED IN SOWING.

THE seed must not be buried, but only just covered in the ground. Where Hemp is chiefly cultivated for the seed, it is much the best way to sow it thin; and if the plant is raised on ridges, or horse-hoed, the seed will be better than what is obtained from broad-cast Hemp: and with respect both to seed and Hemp, it will be best to drill it in equidistant rows, and to hand-hoe it, which will improve both the land and the crop, and less manure will suffice than when it is sown by hand.

Chambers's Dictionary.

By sowing Hemp in drills, a stronger or coarser bark or fibre will be produced, than by sowing it broad-cast. When the Hemp is required for cordage, this method is to be adopted. The seed should be sown in drills about two feet asunder.

Sinclair.

The seed should be gently and lightly harrowed in, and the birds kept off the land till the plants appear.

Suffolk Report.

Sow it reasonably thick, observing not to lay it too deep in the earth; but cover it close and light, with the mould as fine as it can possibly be made by repeated harrowing. It must also be attended very carefully, especially about an hour or two before sun-rise, and the like before sun-

set,

set, until the seed appear, to preserve them from the birds and other vermin, who are greedy devourers of it. If, after harrowing it, you spread over it some pigeons'-dung, it will be useful, provided it be done in moist weather; for without moisture the great heat of such dung would burn the seed.

England's Improvement.

When the seed is sown, it must be put under ground; either by means of the harrow, if the field has been tilled with the plough; or with the rake, if it has been done by hand: but, however well the seed may be covered, you must not lose sight of your field till the Hemp gets fairly above ground. The birds, especially the pigeons, are enemies which must be continually kept at a distance. Though they do not scratch, nor do the least injury to corn newly sown, when the seed is well covered, yet they are still dreadful to Hemp-seed, which rises quite out of the ground when it springs, whereas all other sorts of grain lie concealed in it; and therefore the pigeons, perceiving the Hemp-seed at a distance, when it rises and discovers itself, pick it up, and all is lost. This is almost the only attention which Hemp-grounds require from the seed-time till the harvest.

You must neither sow too thin nor too thick (general rules cannot be given on this head; much depends on the ground and on the seed: it is certain, however, that it is sown thicker than corn). Both excesses have inconveniences that inseparably attend them: yet the danger of sowing too thick is the greater; for, besides the loss of the seed that might have been saved, the ground, being drained of a great part of its juices while the seed is springing up and getting out of the earth, will not have enough left to bring it to perfection. By this means, a great many stalks, especially those that are latest in springing up, are quite choked; or if this should not be the case, yet still they languish for want

want of nourishment, and the Hemp produced has neither the strength nor the length it would have acquired, had it been sown thinner.

Marcandier.

The husbandman should be particularly attentive to the weather when he sows Hemp; for the season then should neither be too dry nor too rainy. If either of these is the case, he had better defer his sowing: though he should, if possible, always choose a time just after a gentle fall of rain. When the soil is deep and in fine order, it is best to sow this seed thick, especially if the Hemp be intended for fine uses; because the plants run most into height when they stand closest together, and their fibres are then by much the finer.

Mills's Husbandry.

When the land is sown, go through the whole with a shovel, and with it make little paths at seven feet distance from each other; so that, at the proper season, you may reach the male plants, which you will have occasion to pull first, without trampling on the female, which must stand at least a month longer to ripen the seed.

Abbé Brulles.

The sowing must be postponed as long as possible, while there is any appearance of night-frosts, such being very prejudicial. And it is also to be observed, that, although those parts of the countries in question,* which produce these articles in the greatest quantities and perfection, are situated within the same degrees of latitude as England or South Britain, the climates of the two countries bear little or no resemblance to one another; the transitions from winter to summer being so much more instantaneous, besides that the heat and cold are far more intense in the former than the latter, that they cannot be said to enjoy any of the advantages of the English spring and autumn; but that this seems to

* Russia, Prussia, Poland, &c.

to be amply made up to them, in the first place, by the very great degree of nourishment which their soil receives from the fat, slimy, nitrous substance, which, on the melting of the snow, remains on the surface, impregnating and opening the ground to the depth of three or four inches, according to its internal quality; and secondly, by the succeeding superior warmth and serenity or constancy of the weather: circumstances, to which the general stability, or rather equality, that may have been observed to have prevailed in the crops of those countries is, no doubt, in a great measure to be ascribed.

——— *Durno.*

It should be sown in drills, or small ridges, about three feet broad, with two feet intervening between the ridges.

——— *M'Donald's Essay.*

Hemp should be sown broad-cast, after the rate of two bushels of seed for an arpent, or four-fifths of a statute-acre. The seed should be harrowed in by a harrow, with small iron teeth set close.

——— *Taylor's Instructions.*

The Hemp-seed should be sown thick; for without this precaution the plants grow too large, and the bark becomes too woody, and the fibres too hard, which is a great defect. Care must, however, be taken, not to sow it so thick, that the plants would choke one another. It is therefore necessary to observe a medium, the knowledge of which is easily acquired by practice; and indeed, in general, Hemp-grounds seldom are too thinly stocked with plants, unless when part of the seed has been destroyed by frosts, drought, or other accidents.

——— *Du Hamel.*

BENGAL.

HEMP PROPER.—*Cannabis sativa.*

The seed should be sown as thick as the Natives do the Sunn, on a rich, free soil, which has been well manured, and repeatedly ploughed and harrowed.

Instead

Instead of sowing the seed very thick, as ought to be done when the plant is intended for cordage, the Natives sow it very thin, and afterwards transplant the young plants, placing them at a considerable distance from each other, often nine or ten feet. By this mode the plants grow up to a very large size, a great deal too large to admit of the stalks being bruised for heckling. This mode of cultivation is also too expensive, if used with the view of preparing cordage from the plant. *Mr. Fleming, Bengal Cons. 5th May*, 1801.

SUNN.

BENARES.—The seed should be sown in fair clear weather.

HURRIPAUL.—When the ground is prepared, about the 10th May, the seed is sown very thick. The sowing should not be delayed beyond seven days.

MALDA.—The seed should be sown after a fall of rain. The thicker it is sown, the better.

HURRIAUL.—The seed is sown by hand in the same manner as the English farmers sow wheat, &c.

RUNGPORE.—The seed is strewed lightly over the ground in the month of April. *Board of Trade Cons. 24th August*, 1792.

JUNGYPORE.—The seed is sown when the rains set in, when the land is as wet as the situation will admit.

KEERPOY.—The seed is scattered over the ground at pleasure.

PATNA.—As the best Hemp (Sunn) is produced from stout and tall stems, the seed is scattered at about half a foot distant from each other.

CHITTAGONG.—The seed is thrown or laid into the ground, as fancy may direct. *Board of Trade Cons. 14th January*, 1793.

The method of sowing in use among the natives appears to be perfectly good, both in respect to the growth of the plant, and for preparation in the European way. *Mr. Douglas.—Bengal Cons. 5th May*, 1801.

HEMP,

MODE OF TREATMENT AFTER SOWING, AS HOEING, WEEDING, &c. &c.

When the plants come up, they should be hoed out like turnips, leaving the plants twelve or sixteen * inches apart, and cutting down all the weeds. The crop will require a second hoeing about a month or six weeks after the first, in order to destroy the weeds; after which the Hemp will soon cover the ground, and prevent the growth of the weeds.

Chambers's Dictionary.

Hemp is esteemed very effectual for destroying weeds: but this it accomplishes by impoverishing the ground, and thus robbing them of their nourishment, so that a crop of it must not be repeated on the same spot.—It also possesses the further property of driving away almost all the insects that feed upon other vegetables; hence, in some places on the Continent, they secure their crops from these mischievous attacks, by sowing a belt of Hemp on any particular spot which they wish to preserve.

Encyclopædia Britannica.

When Hemp is sown broad-cast, all the weeds will be destroyed; but when sown in drills, they appear between the rows. The plant being arrived at the height of four inches, the field ought to be gone over

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* The Encyclopædia Britannica says, two feet.

over with a horse-hoe, which will not only cut away the weeds, but, by throwing up the earth against the roots of the Hemp, will afford them additional nourishment and strength, and at the same time will clear the ground. This operation, therefore, may be repeated with much advantage, as frequently as may be necessary for destroying the weeds.

Sinclair.

No weeding is ever given to it, the Hemp destroying every other plant.

Suffolk Report.

At Swineshead. It is never weeded, as the Hemp itself destroys them all.

At Haxey. The largest of the weeds are taken out.

Lincoln Report.

Hemp does not need weeding. It is so swift a grower, and such a poison to all the weeds, that it over-runneth, choaketh, and destroyeth them.

England's Improvement.

Hemp requires no weeding. It even operates so far as a weeder itself, that by a crop or two of Hemp a foul piece of ground may be cleaned; the quickness of its growth, and the exclusion of the free circulation of the air about its roots, occasioned by the largeness of the leaves, killing or suffocating all sorts of weeds or under-growths.

Durno.

Hemp is so great an enemy to weeds, that some farmers, of no mean esteem for knowledge in their profession, sow Hemp upon their rank-growing soils, on purpose to subdue them. When the Hemp

rises and branches out, it covers the ground so thick, that every weed is choaked that cannot keep pace with it in its growth. Docks, sow-thistles, thistles, and other rank-growers, should be hoed out, or plucked up, while the Hemp is in its infancy. In that state it may be trampled upon, and even rolled; but when it begins to branch, it should be left to itself. Indeed, in very dry seasons, if watering is practicable, Hemp should be watered; for which reason the soils that suit it best are those contiguous to lakes or slow running waters. It requires a continual supply of nourishment, but at the same time that nourishment must be tempered with a proportionable degree of heat. Miller advises hoeing, as soon as the plants begin to appear, and also thinning like turnips. Dr. Hill advises the horse-hoeing culture, and with some shew of reason; for, as in Hemp there is always a double harvest, and in the first one part of the plants is to be pulled and the other left to ripen, his opinion is, that the intervals between the rows give room for that operation to be performed with the least waste possible: and it must be owned, that where the plants grow promiscuously, as they do in Hemp, a multitude of the later-ripe plants must be trampled down and destroyed in the pulling up of those that are first ripe. Hemp, therefore, appears to me to be one of those plants, to which the practice of the new husbandry ought to be applied.

Complete English Farmer.

When the ground is sown too thin, or by any accident the grass gets up and injures the Hemp, the superfluous stalks or weeds must be carefully pulled up, for fear they should be prejudicial to the rest.

The Hemp-grounds which are situated on the sides of streams or rivers, or surrounded by ditches, may be watered in times of great drought. In countries where their situation will allow it, they are drenched by letting the water run in upon them. This labour and attention

tion in the person who cultivates Hemp, often turns out to his advantage, and is well rewarded.

Marcandier.

Though Hemp cannot be weeded without great hazard of damaging the crop; because whatever plants of it are twisted, bent down, or broken through inadvertency of the weeders, or by any other cause, never rise again. Yet if the weeds are so numerous and rank, as to endanger their smothering of the Hemp, it is necessary to root them out; and the most careful persons must be employed for this work, which, when rightly executed, is also attended with this farther advantage, that the pulling up of the weeds loosens the surface of the earth, and thereby forwards the growth of the plants.

Mills's Husbandry.

In very dry seasons, it will be proper to overflow the Hemp-grounds, if it can be done. To this end, the water may be let from the ditches, as is practised for rice-grounds. If any parts of the Hemp-ground are in danger of being burnt up, it will be adviseable to water them, or perhaps rather the whole, in such case, even by hand.

If by any accident the Hemp grows very thin, so as to be thereby in danger of branching out too much, and of becoming woody; this should be an additional motive for keeping it perfectly clear of weeds, in order to let it remain for seed, which will be so much the better the plants having stood thin.

Du Hamel.

Hemp requires no weeding, and, indeed, the leaves and dust of it is of such a nature as to kill almost every weed.

M'Donald's Essay.

BENGAL.

HEMP PROPER.—*Cannabis sativa.*

The plants require to be carefully weeded.

Mr. Fleming.

When the plants are a few inches high, they must be carefully freed from weeds.

Mr. Douglas.—Bengal Cons. 5th May, 1801.

SUNN.

HURRIAUL.—When the plants have got to the height of about eighteen inches, the ground must be well weeded.

HURRIPAUL.—It does not require weeding, the Hemp (Sunn) being set so close, and growing so thick, that nothing else can easily come up.

MALDA.—The ground should be well cleaned of weeds, when the plant is about nine inches high, and again when about one and a half or two feet high.

RUNGPORE.—In about fifteen or twenty days after the plants rise, the ground should be carefully weeded. When the plants have risen to about a haut (half a yard) high, if they have come up too thick, they are transplanted to more open parts of the field; when they have got three-quarters of a yard high, the ground should be again carefully weeded.

Board of Trade Cons. 24th August, 1792.

JUNGYPORE.—It requires no weeding, as the plant soon overtops and destroys grass or weeds by depriving them of nourishment.

PATNA.—It must be kept free from weeds.

CHITTAGONG.—The ground must be kept free from weeds.

Board of Trade Cons, 14th January, 1793.

HEMP,

SYMPTOMS BY WHICH IT MAY BE KNOWN WHEN IT IS RIPE.

THE signs of maturity in the male plants are the yellowness of the leaves and the whiteness of the stalks.

The ripeness of the female Hemp is known by the same signs as that of the male; as also by the seeds beginning to turn brown, and by the capsules which contain them beginning to open.

Chambers's Dictionary.

The Female [*read* Male] * Hemp is known to be ripe by the fading of the flowers, the falling-off of the *farina fœcundans*, and some of the stalks turning yellow. The Male [*read* Female] * Hemp is known to be ripe by the stems becoming pale. But it must be remembered, that hemp of any kind will be much less injured by pulling up the plants before they are ripe, than by letting them stand too long.

Encyclopædia Britannica.

The maturity of the male plants is marked by their leaves becoming of a yellow, and the stem of a whitish colour, and they are readily distinguishable by being more slender, and not bearing seed. The female plant is not in a state to be pulled till a few days after Michaelmas.

Sinclair.

The time of pulling is about thirteen weeks after sowing. The leaves turning yellow and the stalks white, are signs of its maturity.

Suffolk Report

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* The Editors have followed the Abbé Brulles in the error of changing the sexes of the plants.

You will know that your Hemp is ripe when the stalk is grown white, or when you see the leaves fall downward, and turn yellow at the tops; for then it is full ripe. This will happen for the most part about the middle of July.

England's Improvement.

Hemp is never drawn until ripe; which is known by the stalks and pods changing colour, and the seed-grains becoming plump and hard.

Durno.

Towards the end of July, the stalks that bear the flower, and are by some *improperly* denominated the female, begin to grow yellow at the top, and white at the root; the flowers fall, the leaves wither, and this is generally the sign of their maturity.

Marcandier.

The male Hemp, which is the species that produces the *farina fœcundans*, ripens earlier than the female, generally by three weeks or even a month; but the time of the ripening of either depends much on the nature of the soil. The male Hemp shews its ripeness by turning yellow at top, and whitish at the bottom of the stem. But this sort in particular should be pulled rather before it is quite ripe, that is to say, while it is yet somewhat green; for if it be too ripe, its fibres will adhere so strongly to the reed, as not to be separated therefrom without some loss; neither will they be soft, and consequently not so fit for domestic uses, as those of Hemp which is pulled before it has attained to a perfect maturity.

The ripeness of the female, or seed-bearing Hemp, is known, not only by the same signs as that of the male, but also by the seeds beginning to turn brown, and by the capsules which contain them beginning to open.

Mills's Husbandry.

The Female [*read* Male] * Hemp, which is that which bears only flowers

* The Abbé Brulles has changed the sexes.

flowers and no seed, is known to be ripe by the flowers fading, the *farina fœcundans* falling, and some of the stems turning yellow. The Male [*read* Female] is known to be ripe enough by the stems becoming pale. If you stop till the tuft containing the seed appears ripe, or the stems turn brown, the Hemp will be in a great measure spoiled.

Abbé Brulles.

The male or karle Hemp always ripens first, and about the middle of August begins to drop its leaves and turn pale. When this becomes general, then is the time to begin pulling. But the cautious planter will not trust to these signs only, but will examine the seed-vessels, and be sure that all the plants have shed their male dust, otherwise the seed in the latter crop will suffer considerably. *Complete English Farmer.*

The ripeness of the male Hemp may be known from the *farina*, or powder, which it yields on agitation; also from the leaves turning yellow, and the stems a whitish colour. The signs of the female Hemp being ripe, are the opening of the pods wherein the seeds are lodged, so much, that you may just perceive the seeds therein. They will have a brownish appearance.

Taylor's Instructions.

For what Du Hamel says on the Symptoms of Ripeness, see the head PULLING.

BENGAL SUNN.

In Bengal the Hemp is deemed ripe when the blossoms begin to fall. Vide the Head of GATHERING.

COAST OF COROMANDEL.

In the Rajahmundy Circars the crop is cut in February, when the seed-vessels are fully formed; at this time of the growth the Tellinga people reckon the fibre to be at its greatest perfection.

Dr. Roxburgh.—Bengal Cons. 9th July, 1801.

HEMP,

THE MANNER OF GATHERING WHEN RIPE.

THE way of gathering Hemp, is by pulling the plant up by the root, after which it is bound up in handfuls or bundles.

The first season for pulling is about the middle of August, when they begin to pull the male or fimble Hemp: but Mr. Miller says, it would be better to defer this for a fortnight or three weeks longer, till the male plants, which contain the *farina fœcundans*, have shed their dust, without which the seeds all prove abortive, produce nothing if sown the next year, and fetch no price at the oil-mills, because they are only empty husks without any kernel for yielding the oil; but they begin to decay after having shed their farina. The remaining plants, which are the female or karle Hemp, are to be pulled a little after Michaelmas, when the seeds are ripe.

Chambers's Dictionary.

As there are two kinds of Hemp, the male and the female, of which the former [read *latter*] only produces seed, some regard must be had to this circumstance. In Suffolk the male and female are pulled together, about thirteen weeks after the sowing; but in the Fens they are frequently pulled at different periods, in the manner recommended by the Abbé Brulles, who, for the more easy accomplishment of it, directs that little paths should be made longwise through the field, at about seven feet distance from each other, to allow a passage for the person who pulls up the female Hemp from among the other; the latter

latter requiring to stand more than a month after for the purpose of ripening the seeds.

After the Hemp is pulled, it must be taken in large handfuls, cutting off the roots (though this is not absolutely necessary); the leaves, seeds, and lateral branches being dressed off with a wooden sword or ripple. It is then to be made up into bundles of twelve handfuls each, in order to be steeped.

Encyclopædia Britannica.

About the middle of August the male plants will be ready for pulling, which period is called the first Hemp-harvest. The female plant is not in a state to be pulled till a few days after Michaelmas, when it is to be taken up and dried.

It is proper that a part be kept separate for seed, which requires no particular cultivation, further than the male being allowed to stand a little longer on the ground, that it may attain its full perfection, and be enabled to shed the farina with full effect on the female.

Sinclair.

Hemp is pulled thirteen or fourteen weeks after sowing: the wetter the season, the longer it stands. It bears a dry season better than a wet one. No distinction is made in pulling between the male and female, or, as it is denominated in some places, the Fimble and the Seed Hemp. In the Cambridgeshire fens they are frequently separated, which may arise from the Hemp being coarser and the stalk larger. The price of pulling it is one shilling a peck of the seed sown, or eleven shillings an acre, and beer; but if it comes in harvest, the expense is higher. It is tied up in small bundles, called *baits*.

Suffolk Report.

The time of pulling is about the beginning of August, or more properly speaking, thirteen weeks after sowing.. The male and female

Hemp is pulled together: indeed, when the crop is thick, it is impossible to separate them. The expense of pulling is generally estimated at one shilling per peck, according to the quantity originally sown. When it is all taken up, it is bound in small bundles, with bands at each end, to such a bigness as you can grasp with both hands. It is then set up like wheat in shocks, till the seed will freely shed, when it is threshed out.

Rev. Mr. Mills, in Suffolk Report.

At Swineshead, they pull it up at Old Lammas, leaving the strongest for seed. They used formerly to take the male from the female; but this is left off. It is bound in sheaves, and left in shocks of five for a week. If the crop is kept till spring, it is tied in larger bundles, and stacked and thatched. It is reckoned, however, preferable, to set it at once; for which purpose they tie it up in *gleans* single.

At Haxey, the fimble, or male Hemp, is pulled about the 20th of August; the female is left till Michaelmas. The fimble is bound into sheaves or *beats*. As for the Hemp left in the field, it is pulled about Michaelmas, and bound in sheaves or shocks on the land, where it is suffered to remain for ten days.

When pulled, bind it in sheaves, leaving them in shocks of five for a week: then clean the plants from dirt, and turn the sheaves, and set them together again. If they keep the crop till the spring, they bind it in larger bundles, and stack and thatch; but it is considered preferable to set it at once, for which purpose they set it in gleans single.

Lincolnshire Report.

When ripe, it must be pulled up by the roots, and not cut as corn. But if you intend to save any for seed, you must reserve the principal stalks, and let them stand till the latter end of August, or sometimes till the

the middle of September; and then, when you observe the seed turn brown and hard, gather it; for if suffered to stand longer, it will shed very much.

England's Improvement.

In the first pulling of Hemp, care must be taken in selecting the male, and preserving as many of the female plants as possible unhurt.

Complete English Farmer.

In Russia, &c. those who proceed systematically, and refine most on gaining the best possible quality, make a distinction between the male and female, or such stalks as do and such as do not bear seed-pods, drawing the latter,* or female, earlier than the former, *viz.* as soon as the stalks only begin to change colour, and always taking care to keep them separate, as rendering a finer harle than the male.

Durno.

Towards the end of July the male plants are pulled up, and made up into small bundles, which are ranged upon the verge of the field; taking care, as much as possible, to place the stalks, which are of the same length, equal at both ends, but especially at the roots. It must also be observed, in pulling up these stalks, not to hurt those which are to stand and bear seed. This done with proper caution, will give new strength to the plants that are left on the ground; for this kind of weeding not only delivers the Hemp-ground from a great number of plants that exhausted its strength, and injured and choaked one-another, but is also an operation useful to the rest that remain, by raising and stirring up the ground about them.

Marcandier.

As

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* As this is different from the practice in England, where the male is first pulled; I am inclined to think Mr Durno is also in an error respecting the sexes.

As soon as the male Hemp is ripe, it is pulled stem by stem, and with caution not to injure the female, which must remain on the ground some weeks longer, that is to say, till it also is ripe, and then it must likewise be pulled stem by stem.

When the female Hemp is let stand till its seed is perfectly ripe, its bark becomes woody, and so coarse, that no future operation can bring it to a proper degree of fineness: for this reason it is generally pulled before the seed is quite ripe. But as it is manifestly the husbandman's interest to sow none but the best seed, he ought not to grudge the sacrificing of the goodness of a small part of his Hemp to the superior advantage of obtaining perfect seed, by letting a proper number of these plants stand till their seeds have attained full maturity. The judicious M. de Chateauvieux, whose attention extended to the most proper method of cultivating every useful plant, did not neglect so important an object as the quality of the Hemp employed in cordage, and the means of obtaining its seed in the greatest perfection. However, not having had opportunities of continuing his experiments long enough to draw certain conclusions from them, he invites all those who have the public good at heart, to make experiments which may lead to the utmost improvement of the culture of this plant:—"But," says this friend of mankind, "these motives of "œconomy are vastly inferior to the inestimable advantage of saving "ships, their cargoes, and their crews, which often depends on the "strength of their sails and cables."

On the 26th of April, 1753, he sowed six beds with his drill-plough, placing six rows in each bed. The beds were seven feet wide, and the soil strong, but in very fine tilth. He treated his plants with great care, according to the principles of the new husbandry; but both that and the ensuing year were unfavourable to the growth of Hemp. However, he observes in general, that his plants were five or six feet high, that their

stem

stems were large, and their bark very thick and strong. They were very fruitful in seed, especially the two outer rows, which had profited most by the hoeing. M. Aimen from forty plants of Hemp raised in the common way, and which might be deemed fine ones, had only a pound and a half of seed; but a single plant, which grew by itself, yielded him seven pounds and a half of much better seed than any that is produced in the common way. From hence it results, that it must be of great advantage to the husbandman to set apart a spot of ground, sufficient to rear thereon as many plants of Hemp, as will afford him seed enough for the purpose of sowing, and to cultivate them according to the principles of the new husbandry.

Mills's Husbandry.

When ripe, draw out carefully the whole of the Female [*read* Male] Hemp, breaking, as little as possible, the stems of that which you take, or of that which you leave.

When the Male [*read* Female] Hemp is come to a proper degree of maturity, you must get a sufficient number of hands, so as to expedite the business, because such as remains standing after it is ripe, will have its rind fixed to the reed, the gum turned hard and dark-coloured; and the whole operation of drawing becomes difficult, troublesome, and ungrateful.

Immediately as the Hemp is gathered, take it in as large handfuls as you can, and either cutting the roots off, or leaving them on, as you like best (I prefer cutting them off). Hold the root-end uppermost, and with a wooden sword dress off the flowers and leaves, which you leave on the field, since they assist in manuring it: pick out any weeds or spoiled plants; put twelve handfuls or gripes together to make a bundle.

Abbé Brullés.

Hemp, for ordinary, grows to a prodigious height; and the early Hemp is generally ready for pulling about the middle of August, or sooner; but the seed, or female Hemp, is a month later of being ripe.

M'Donald's Essay.

When the male Hemp is well ripened (which will be about the second week in August), let the persons who pull the Hemp clear passages through the field, of about two feet wide, and six feet distant from each-other, by pulling up the male and female Hemp which grow promiscuously within the said space of two feet. Let the Hemp thus plucked be carried to other ground in the neighbourhood, and spread thereon, about an inch thick. After it has been thus laid for two or three days exposed to the sun and air, turn it with a small pole, and let it lie a day or two more. Then bind it up in bundles, about the thickness of your thigh, or near three quarters of a yard in circumference; and either proceed to water-rot it, as it is termed, immediately, or house it from rain, till a more convenient opportunity offers for the purpose.

After having done this, proceed to pull up the male Hemp which is left growing amongst the female Hemp, leaving the latter to grow with as little injury as possible until the seed is ripe. The male Hemp may be dried in the intermediate space of ground above-mentioned, and made up into bundles as the former.

The female Hemp should remain growing till the seed is fully ripe. It may probably be the first or second week in October before the female plant should be pulled. It should then be carefully pulled, to avoid shedding the seed, and bound in small bundles, and set to dry with the root-ends downwards.

Taylor's Instructions.

About the beginning of August the Hemp-stalks which do not bear

bear seed (by some improperly termed *Female Hemp*, but which we shall call the *Male*) begin to turn yellow at top, and whitish at the bottom of the stem. As soon as these indications of ripeness are perceived, the women enter the Hemp-ground, and pull all the male stalks, which they arrange in handfuls along the border of the field. In doing this care must be taken to injure the female Hemp as little as possible, as it must remain on the ground some time longer, for the purpose of ripening the seed.

In making up the Hemp, care must be taken that the stalks which form each handful should be as nearly as possible of an equal length; and the roots, in particular, should be placed as even as possible: this done, each handful is to be bound with a stalk of Hemp.

If the female Hemp is suffered to stand too long, the rind becomes too woody; the consequence of which is, that the fibres obtained from it are coarser and harder than those from the male. When the Hemp-growers perceive, that the seed is properly formed, they pull up the female Hemp, and arrange it in handfuls in the same manner as the male. On the other hand, Hemp must not be pulled too green. When this is the practice, the fibres are, it is true, more supple, but the ropes made therefrom are not so lasting as when obtained from riper plants.

Du Hamel.

BENGAL.

HEMP,—*Cannabis sativa.*

When the Hemp flowers, which it does in about four months after being sown, the stalks should be pulled up and exposed a day or two to the sun. They are then to be tied up in bundles for watering.

Mr Fleming and Mr. Douglas.—Bengal Cons. 5th May, 1801.

SUNN.

BENARES.—At the close of the rains, or about the end of September, the Hemp (Sunn) is ready for cutting.

HURRIAUL.—After sowing, nothing further is required till the month of August, by which period it is at its full growth, about five feet, and the flowers make their appearance. It is then, except what is intended to be reserved for seed, cut down as close to the ground as possible, and laid in ridges; care being taken to place the plants so that the leafy parts lie one upon another. In this state they continue ten or twelve days, or until the leaves begin to rot and fall from the stalks on being shaken.

HURRIPAUL.—In about six weeks after sowing it will be seven and a half or eight feet high, at which time it bears a yellow flower. At this time it is cut down, except what may be left for seed, the fibres from which will be inferior.

MALDA.—In February the Sunn is in flower. Some gather it in this season, when the fibres are softer and the quality finer than when it is in seed, which happens in March and April. The way of gathering the seeded Hemp (Sunn) is to cut off the head of the plant about a foot or a foot and a half from the top, for the purpose of obtaining the seed, and to pull up the remainder of the plant, which yields the Hemp (Sunn), by the roots. Such is the practice round the Factory, but in the adjacent country the practice is different. The Hemp being ready, which happens in September, is not pulled up by the roots, but cut down, because, from growing in the rainy season, the stalks are much larger and stronger. Some cut it in flower, some in seed. The Hemp being cut, is left three or four days in the field, during which time the greater part of the leaves drop off. The last-mentioned Hemp (Sunn), which is sown in June and gathered in September, is both finer and stronger than the other.

RUNGPORE.

RUNGPORE.—In about four months from the time of sowing the plants will have arrived at maturity; at which time their height will be about five hauts. The plants which are reserved for seed are generally allowed to remain a few days longer on the ground than the rest, till the seed begins to loosen in the husk.

Bengal Board of Trade Cons. 24th August, 1792.

DACCA DISTRICT.

BAZETPORE.—About five months after the plants come up, on their being sufficiently matured, they are taken up by the roots and tied in bundles.

TEETBADDY.—CHAUNDPORE.—On the falling of the blossoms, which is in about four months at Teedbaddy, and in about five or six months at Chaundpore, the like process is pursued.

SERAMPORE.—On cutting the plants, the tops are separated and thrown away.

DACCA-JELALPORE.—In three months after sowing, the plants are cut down.

MOMENSING.—The plants blossom in Maug or Faugun (January or February). After blossoming, or the plants are cut down.

TIPPERAH.—In five or six months after sowing, or in Chyte and Bysaak (March and April), the plants are cut down and made into bundles.

SYLHET.—In about four months after sowing, the plants are cut and tied in bundles.

JUNGYPORE.—The plant is cut when in flower, from the 20th of September to the 10th of October, being sown in all June.

KEERPOY.—In Ausseen (September) the Sunn is cut.

PATNA.—The Hemp (Sunn) grows to the height of six or seven

feet; and when it begins to flower, about November, it is cut down. That reserved for seed is ripe and cut in January and February.

CHITTAGONG.—When the plant is come to maturity, which will be in about four or five months after sowing, it is pulled up by the roots and tied in small bundles.

Board of Trade Cons. 14th January, 1793.

The plants are pulled in September, and the article is prepared for market by the end of the month.

Mr. Fleming.

When the seed is nearly ripe, the plants should be pulled up.

Mr. Douglas.

When the seed is nearly ripe, the plants should be pulled up, and exposed to the sun two or three days to strengthen their fibre, and then be tied up in bundles.

Board of Trade Cons. 5th May, 1801.

COMMERCOLLY.—The plants of Phool-Sunn begin to seed from the beginning of March to the middle of April. They are pulled just before the seeds are ripe, and tied in large bundles for watering.

The seed of Boggy-Sunn ripens from the 25th July to 30th August.

Board of Trade Cons. 12th June, 1801.

KEERPOY.—In general the Riotts pull the plant as soon as the flowers are dropped (in August and September), leaving only a little in the corner of the field to stand for seed.

Board of Trade Cons. 21st July, 1801.

The Natives cut the plant only when the seed is ripe: this they acknowledge prejudices the fibre. When they would have it good, for their own use, and not for sale, they cut it in flower, which gives both a cleaner and a stronger fibre.

Mr. Frushard.— Board of Trade Cons. 12th September, 1801.

HEMP,

METHOD OF OBTAINING THE SEED.

WHEN the female Hemp is gathered, they let it stand eight or ten days in the air, that the seed may dry and ripen; after which they cut off the heads, or beat out or thresh them to get the seed. The seed which falls out the easiest is the ripest and best, and should therefore be reserved for sowing in the next spring; and as to that which remains in the heads after this operation, it is got out by combing the heads on the teeth of a ripple, which pulls off the leaves and husks of the seeds, and the seeds themselves, altogether. These are gathered in a heap, and left in that condition for a few days, in order to their heating a little, after which they are spread out to dry: then they are thrashed, and the seeds are separated by winnowing and sifting. This second seed is much inferior to the first, and accordingly it is used only for extracting the oil from it, or feeding of poultry.

Chambers's Dictionary.

The leaves are to be stript off with a wooden sword, as are likewise the seed, the branches which grow laterally, and even the tuft bearing the seed at the top: but if this latter should not come off clear, it must be chopped off with an iron instrument. All this must be done over a cloth, or on a spot of ground in the field, well levelled and smoothed, to avoid losing any of the seed: and it is proposed, and said to be successful, to leave the seed abroad, covered with the leaves, &c. to preserve it from birds, that it may heat and be threshed in the field, and the

leaves

leaves and chaff strewed on the land. This certainly saves trouble, and is practised in many places; but it seems to me to be slovenly, and I should rather take it home to a barn: but I would certainly burn all the roots, and such parts as are too hard to rot easily, and strew the ashes, as well as the leaves, and such other parts as will easily rot, upon the ground; as these matters are reckoned to go half-way towards manuring the land for the next year's crop.

Abbé Brülles.

Some are of opinion, that, by putting the clusters which contain the Hemp-seed to heat and sweat, the quality is improved; as many of those seeds which would otherwise wither and die away, may thus arrive at perfection. This, however, seems to be very problematical, as there are no experiments which shew that seeds, when separated from the vegetable producing them, have any power to meliorate themselves.

Encyclopædia Britannica.

At Haxey, in Lincolnshire, the seed, when dried, is threshed on a cloth in the field.

Lincolnshire Report.

For gaining the seed of the Hemp, the stalks, as soon as drawn, are carefully set up on their root-ends against walls, until they are perfectly dry. The roots, and the tops as far as the seed-pods extend, are then cut off, and the former thrown away as useless. The latter are immediately threshed out and cleaned.

If the seed, instead of being immediately cleansed, is suffered to remain for any length of time in a foul, moist state, its colour will be spoiled, and its substance so much injured, that it cannot with safety be employed for sowing; nor will it, even when crushed, produce either the

the same quality or quantity of oil which it would otherwise have rendered.

Durno.

In some places, to complete the ripening of the seed, round holes are dug about a foot deep, and three or four feet in diameter, in different parts of the Hemp-ground, and the handfuls of pulled Hemp are set as close together as can be in these holes, with their seed-ends downward, and their roots uppermost; after which, to keep them in this position, the whole is tied round with bands of straw, and the earth that was taken out of the hole is thrown up all around this great sheaf, so as quite to bury the heads of the Hemp, which, when thus covered, heat, by means of the moisture contained in them, in the same manner as a stack of green-hay, or a heap of dung. This heat completes the ripening of the seed, and disposes it the more easily to quit its husks; and when it has been brought to this condition, the Hemp is taken out of the holes, where it would become mouldy if it were left longer in them.

In other places, where the crops of Hemp are great, the husbandmen do not bury the heads of their Seed-Hemp in the manner above described; but only lay it in heaps, with the seed ends one against another.

Those who have only small crops of Hemp, spread upon the ground a cloth to receive the seed: others content themselves with spreading the bundles upon a clean and even spot of ground, with all the heads turned the same way. The seed-ends thus placed, are beaten slightly, either with a stick or a light flail. The seed which falls out easiest is always the ripest and best, and should therefore be reserved for sowing the next spring: and as to that which remains in the heads of the Hemp after this

operation,

operation, it is got out by combing the heads of the Hemp on the teeth of a ripple, which pulls off the leaves, the husks of the seeds, and the seeds themselves altogether. These are gathered in a heap, and left in that condition for a few days; after which they are spread out to dry, and then threshed, and finally the seeds are separated and cleaned by winnowing and sifting. This second seed is used only for extracting oil from it, or for feeding poultry and birds.

As for the Hemp, it is carrried to the steeping-place, to undergo the same process as the male Hemp.

Du Hamel.

After reciting what Mr. Du Hamel says as above, Mr. Mills, in his Practical Husbandry, notices the following observations from the Memoirs of the Royal Society of Agriculture at Tours, "that it is hard to conceive, how an operation, which tends to bring on at least some degree of putrefaction, can ripen the seed: and therefore this must be at best a very dangerous practice, especially as a seed so very oily as that of Hemp, and consequently so apt to become rancid, cannot but be liable to be rendered still more so by this degree of heat."

It is also justly remarked in the said Memoirs, "that by the threshing of Hemp there is always danger of bruising some of its seeds, and that the bruised seed will not grow, though it may be fit for yielding oil. Nor is this all; for by thrashing out the seed there is a mixture of imperfect seed with that which is fit for sowing; and this is the reason why husbandmen have always found it necessary to sow a greater quantity than would otherwise be requisite, in order to make up for the uncertainty of its growth."

The method of separating the finest grains of wheat for sowing, by throwing the corn to a distance on a barn-floor, is equally advisable for obtaining

obtaining the heaviest and best Hemp-seed, where proper care has not been previously taken to provide such. In this case, the ripple may be used to separate the whole of the seed from the plant, and this will prevent the inconveniences which arise from the threshing or beating out of the seed.

Mills's Husbandry.

In the beginning of September, or rather when the seed appears to be well-formed, ripe, and ready to fall of its own accord, the Hemp is to be pulled and arranged in parcels, in the same manner as is directed for the male Hemp. Immediately after this, the Hemp must be put into proper places to be watered. These operations should be performed during the fine weather, with all the dispatch that time and weather will admit.

Marcandier.

The seed-pods may be cut off and dried upon frames. This mode will be found of great advantage to the Hemp, as the seeds and pods of it are of such a sticking, glueish nature, that the Hemp often suffers by sun-burning before the seed be sufficiently win. Besides, the operation of beating it off the husk must damage the Hemp before watering.

At all times, after the seed begins to ripen, if it is not carefully watched, it will be destroyed by birds, as they are excessively fond of it.

M'Donald's Essay.

Avoid losing the seed in pulling or drying; and when the bundles are dry, you should have a wooden stool, with a sheet or blanket under it, and by striking the Hemp against the stool, to beat the seed from it into the sheet or blanket, breaking your Hemp as little as possible.

After

After you have separated the seed from the Hemp, either by beating it as above, or by thrashing it subsequently, you must be careful of the seed, particularly whilst it is new, to prevent its heating, which is best guarded against by frequently turning it. It should then be kept in a dry place, but not too close; for the air will assist in preserving it.

Taylor's Instructions, &c.

BENGAL.

SUNN.

MODE OF OBTAINING SEED.

HURRIAUL.—In the month of August the flowers begin to appear, and in October the seed is ripe. The pods which contain it are then cut from the stalks and hung up in houses, until they are thoroughly dry; the seed is then taken out of the pods, put in earthen pots, and kept in a dry place, until the season for sowing, and it is then, without any other preparation, fit for putting into the ground.

RUNGPORE.—The heads containing the seed are cut off, and laid by a few days to dry; after which the seed is cleared from the husk, by rubbing in the hand, and laid by, without any particular care, for the next season.

MALDA.—The way of gathering the seed Sunn is to cut off the head of the plant, about a foot, or a foot and a half from the top, for the purpose of seed, and to pull up the remainder of the plant, which yields the Hemp, by the roots.

Board of Trade Cons. 24th August, 1792.

KEERPOY.—When the Hemp (Sunn) is fully grown, the seed is thrashed out, dried, and laid by for future sowing.

Board of Trade Cons. 14th January, 1793.

HEMP,

AVERAGE PRODUCE.

An acre of Hemp on the best land yields from two to three quarters of seed; and this seed, with the Hemp *unwrought*, is worth from £6 to £8 sterling, and if the Hemp be wrought, from £10 to £12, or more: but the male, or fimble Hemp, is not worth more than half as much as the karle, or female.

Chambers's Dictionary.

An acre, on a rich soil, produces, on an average, thirty-six to thirty-eight stone, and nearly three quarters of seed.

Encyclopædia Britannica.

The produce of an acre may, on an average, be reckoned forty-five stone. (The Suffolk stone is fourteen pounds and a half, at seven shillings and sixpence).—Some crops rise to fifty-five and even more; and there are bad ones so low as twenty-five. If sold on the ground as it stands, it generally produces one shilling per rod, or £8 per acre.

Suffolk Report.

The soil and season make a very material difference in the produce and quality. An acre will produce from twenty-five to sixty stone: an average crop may be reckoned at about thirty-six or thirty-eight. The seeded Hemp is not so good by one shilling and sixpence, or two shillings per stone.

The

The prices vary very much. Dew-ret Hemp, or Hemp retted by the dew, instead of water, sells from one shilling to eighteen-pence or two shillings per stone lower than Water-ret. The present price [in 1797] of the best Water-ret is about eight shillings and sixpence per stone; but this is very high.

A Stowmarket Manufacturer, in Suffolk Report.

In the state Hemp comes from the brake, tied up in stones, it will fetch from six shillings to seven shillings and sixpence per stone. In 1787 it sold as high as nine shillings.—The produce is so variable and uncertain, that in one season a rood and six perches of land has produced seventeen stone; and another, with the same culture and manure, only twelve.

Rev. Mr. Mills, of Bury, in Suffolk Report.

At Swineshead, in Lincolnshire, forty-five stone is thought a fair average crop: fifty is deemed very good.

At Haxey, forty stone is deemed a good crop; fifty is very rarely obtained: from thirty to thirty-five may be reckoned as the average. Many sell it by the acre. In peace, the price was £3. or £3. 10*s*. per acre. It was last year [1798] £5. Price per stone from the breaker was in peace four shillings and sixpence or five shillings per stone: of late it has been from six shillings and sixpence to seven shillings.

Produce of seed may be reckoned at from twelve to sixteen strike per acre: it has been six shillings.

At Butterwick, in the Isle, they manure for Hemp, and get fifty stone and upwards. The quality of the Hemp is best from old Hemp-land: it is worth two shillings more per stone than from other lands.

Lincoln Report.

In England, 125 lbs. of female [*read* male], and 375 lbs. of male [*read* female] Hemp, and sixteen bushels of seed, per acre.

Abbé Bru'les.

Ten hundred-weight per acre.

Mr. Tonge, in Annals of Agriculture.

Sir Joseph Banks, in his Letter to the Lords of the Committee of the Privy Council for the Affairs of Trade, dated the 30th July, 1802, quotes Mr. Justice Elmsly of Canada, as calculating the produce at a ton for four acres, which (Sir Joseph says) is the usual way of reckoning.

BENGAL.

SUNN.

BENARES.—One begah, in a favourable season, will produce about three maunds of Hemp (Sunn).

The Resident does not give the produce of an acre; but assuming his computation of four begahs to an acre in Benares, it will be twelve maunds per acre; about eight English hundred-weight.

COMMERCOLLY.—The produce will be a maund and a half of sixty Sicca-weight; at three begahs to an acre in Bengal, is about four maunds and a half per acre, or three hundred-weight.

HURRIAUL.—An acre of good ground, well prepared, will yield about seven and a half or eight maunds, or five hundred-weight.

HURRIPAUL.—From seven maunds and a half to ten maunds and a half, according to the soil, or, on a medium, six hundred-weight.

MALDA.—On an average about two maunds and a quarter per begah, or six maunds and three quarters per acre: about four hundred-weight. In districts liable to inundation, the produce is little more than half as much as when the soil is high and good.

RUNGPORE.—On an average about four maunds per begah in its rough state, or about 900 lbs. per acre.

KEERPOY.—About five maunds per begah, or fifteen maunds per acre: equal to ten hundred-weight.

Board of Trade Cons. 24th August, 1792.

DACCA DISTRICT.

BAZETPORE.—A good produce, three maunds per begah, or nine per acre: six hundred-weight.—A middling, two maunds and a quarter per begah, or six and three quarters per acre.—An inferior, two maunds per begah, or six per acre: about four hundred-weight.

TEETBADDY.—If the produce is good, about three maunds per begah, or nine per acre: six hundred-weight. If indifferent, only from two to three maunds per begah, or from six to nine maunds per acre: from four to six hundred-weight.

CHAUNDPORE.—One cauny of land produces nine or ten maunds.

SERAMPORE.—A good produce is about two maunds and a quarter per begah, or six and three-quarters per acre: something more than four hundred-weight.

DACCA-JELALPORE.—From four and a half to five maunds, more or less per begah; or from thirteen and a half to fifteen maunds per acre: from nine to ten hundred-weight.

MOMENSING.—About four maunds per begah, or twelve per acre: about eight hundred-weight.

TIPPERAH.—About three or three maunds and a half per begah, or from nine to ten per acre: something more than six hundred-weight.

SYLHET.—About twenty-six or twenty-seven seers per begah (about two maunds), or six maunds per acre: four hundred-weight.

JUNGYPORE.—Eight Factory maunds, seventeen seers and seven chitticks per acre: about six hundred-weight.

KEERPOY.—About three maunds per begah, or nine per acre: six hundred-weight.

PATNA.—About six maunds and a quarter per begah: about twelve hundred-weight.

CHITTAGONG.

CHITTAGONG.—If the ground is good, about three or four maunds per begah, or from nine to twelve per acre; if not, only two or three per begah, or from six to nine per acre: from four to eight hundred-weight.

Board of Trade Cons. 14th Jan. 1793.

A begah will yield from two to two maunds and a half; or from six to seven and a half per acre: from four to five hundred-weight.

Mr. Fleming—Board of Trade Cons. 5th May, 1801.

A begah of good plants will yield from one and a half to two maunds of dressed Sunn, or from three to four hundred-weight per acre.

Mr. Douglas, ditto.

COMMERCOLLY.—From two and a half to three maunds per begah, or from three to four hundred-weight per acre.

RUNGPORE.—From one to one maund and a half, or from two to three hundred-weight per acre: it seldom exceeds the latter.

Board of Trade Cons. 12th June. 1801.

BAULEAH.—About two maunds per begah, or four hundred-weight per acre.

Board of Trade Cons. 23d June, 1801.

SOONAMOOKY.—Two maunds the begah of eighty covids.

Board of Trade Cons. 17th July, 1801.

SANTIPORE.—Two maunds of eighty Sicca-weight per begah.

GOLLAGORE.—Fifteen begahs only produced twenty-two seers, owing to the seed being bad.

Board of Trade Cons. 22d October, 1801.

CHITTAGONG.—Has calculated each cauny of land at only two maunds, though the produce is seldom less than from three to three and a half.

Board of Trade Cons. 22d May, 1802.

HEMP,

PROFIT ON CULTIVATION.

HAVING thus traced the material through its various stages as a production of the soil, I shall close this part of the work with the following statements, by which it will appear how far it may be considered as a profitable article of cultivation.

In Hemp countries, when the season is favourable, they have immense returns; insomuch, that the profit arising from five or six acres is found sufficient to support a family.

M'Donald.

The ABBE BRULLES calculates the expences and profit of an acre of Hemp in England as follows:

	£	s.	d.
Rent - - - - - - - - - -	1	0	0
Manure, the first year more than others; but it is most advantageous to sow after a turnip crop: say - -	2	0	0
Three times ploughing and harrowing - - -	0	18	0
Seed, two bushels (price unknown, but in France 5*s.*)	0	10	0
Pulling the female [*read* male] Hemp, and trimming -	0	10	6
Cutting male, [*read* female] and trimming for putting in water	0	7	0
Getting from reed, and washing the female [*read* male] 7lb. per diem, at nine-pence—50 bundles, containing 125lbs.	0	13	6
Getting the male [*read* female] from the reed, and washing, 14lbs. per diem, at nine-pence—375lbs. - -	1	0	1
Soap, 10lbs., at price in France, three-pence - -	0	2	6
Thrashing seed - - - - - - - -	0	2	6
Total expences -	£7	4	1

Produce.

Female [*read* male] Hemp, 125lbs., at only one shilling, but worth in the rough much more - - - - - -	£6	5	0
Seed, 16 bushels, at five shillings, supposed undervalued	4	0	0
Male [*read* female] Hemp, 375lbs, at seven-pence halfpenny per lb. - - - - - - - - - -	11	14	0
Faggots - - - - - - - - - -	1	0	0
Total produce -	£22	19	0
Total expences -	7	4	1
Total profit - -	£15	14	11
To which should have been added the bounty granted by Parliament of three-pence per stone. R. W. -	0	8	10
Total - -	£16	3	9

Suppose the expenses under-rated £1 per acre, and the gain over-rated £4. 15*s.*; there still remains £10 clear gain; to which is to be added, that the further improvement of the material in dressing and spinning employs the poor, and particularly women and children, who are a heavy burthen to the farmer in all countries.

In SUFFOLK the Account of an Acre may be thus estimated:

Expences.

Rent, tythe, and rates - - - - - -	£1	10	0
Manure, 25 loads, at 1*s.* 6*d.* - - - -	1	17	6
Three earths, at 4s. harrowing included - - -	0	12	0
Seed - - - - - - - - -	0	16	6
Sowing - - - - - - - - -	0	0	6
Carried forward -	£4	16	6

	Brought forward -	£4	16 6
Pulling - - - - - - - -		0	12 10
Watering - - - - - - - -		0	12 0
Grassing - - - - - - - -		0	10 0
Breaking - - - - - - - -		2	12 6
Carriage and delivery - - - - - - -		0	5 0
		£9	8 10

Produce.

Forty-five stone, at 7*s.* 6*d.* - - - - - -		£16	17 6
Expences - - - - - - - -		9	8 10
	Profit - - -	£7	8 8
To which should have been added the bounty granted by Parliament of 3*d.* per stone - - - -		0	11 3
	Total - - -	£7	19 11

All accounts of this sort must be received with due allowances for many variations. The preceding was taken at Hoxne; but at Beccles (where however the quantity cultivated is not equally great), a very different mode of calculation takes place, and rent is valued.

Expences.

Rent, tythe, and rates - - - - - -		£4	0 0
Manure - - - - - - - -		3	0 0
Tillage - - - - - - - -		1	4 0
Seed, twelve pecks - - - - - -		1	16 0
Pulling - - - - - - - -		0	19 0
Watering - - - - - - - -		0	12 0
Grassing - - - - - - - -		0	10 0
Breaking - - - - - - - -		2	10 0
		£14	11 0

Produce.

Fifty stone, at 8*s.*	£20	0	0
Expences	14	11	0
Profit	£5	9	0
To which should have been added the bounty granted by Parliament of 3*d.* per stone	0	12	6
Total profit	£6	1	6

A further statement in the Suffolk Report, by the Rev. Mr. Mills, of Bury, and continued by Arthur Young, Esq. gives it as follows:

Expences.

Rent of an acre of land	£1	0	0
Ploughing, sowing, &c.	0	10	6
Three bushels and a half of seed (sold from 1*s.* 4*d.* to 2*s.* 6*d.* per peck) at 1*s.* 6*d.* per peck	1	1	0
Boy keeping off birds, a week or more	0	1	6
Pulling, at the rate of 1*s.* per peck, according to the seed sown	0	14	0
Getting it in and out of water, turning and laying up	1	1	0
Tythe and rates, suppose	0	6	0
The lowest crop mentioned is forty-eight stone per acre, let us suppose only forty, breaking 1*s.* 3*d.*	2	10	0
Total	£7	4	0

Produce.

Forty stone, at 7*s.*	£14	0	0
Parliamentary bounty, 3*d.* per stone	0	10	0
	£14	10	0
Expences	7	4	1
Net profit per acre	£7	6	0

From the LINCOLN REPORT.

At SWINESHEAD.

Expence.

Three ploughings and harrowing			£0	15 0
Seed			0	15 0
Sowing			0	0 6
Pulling by the hundred (120) 1100, at 1*s.* 6*d.*			0	16 6
Knocking and burning, at 6*d.* per hundred			0	5 6
If tied five in one, it is 2*d.* per hundred; or 6*d.* single tying at the root-end as well as at top			0	1 10
Watering, casting			0	5 6
Spreading, two women			0	2 6
Putting in			0	2 0
Sods and sodding			0	2 0
Taking off sods and taking out			0	2 6
Carting			0	5 0
Twice turning			0	3 0
Gathering			0	3 0
Carting to barn			0	4 0
Breaking, 45 stone			2	5 0
Carrying out, 1*d.* a stone			0	3 9
Rent	£1 10 0			
No tithe—poor-rates	0 5 0			
Drainage tax	0 2 0			
			1	17 0
			£8	9 7

Produce.

Produce.

Forty-five stone, at 6*s.*	£13	10	0
Pullings, four stone, at 2*s.* 6*d.*	0	10	0
	£14	0	0
Expences	8	9	7
Profit	5	10	5
To which should be added the bounty granted by Parliament of 3*d.* per stone.	0	11	3
Total Profit	£6	1	8

At HAXEY.

Expences.

Five ploughings, at 4*s.*	£1	0	0
Harrowing, 1*s.* a time	0	5	0
Manuring, twelve loads, at 3*s.*	1	16	0
Seed, two strike and a half	0	15	0
Weeding	0	1	6
Pulling by women, fembling	0	5	0
Carting, retting, sodding, unsodding, taking out, and treading	0	5	0
Spreading and turning	0	1	6
Gathering, binding, and leading home	0	2	6
Breaking, thirty-five stone at 1*s.* 6*d.*	2	12	6
Pulling the Female Hemp	0	5	0
Thrashing and beating	0	6	0
Dyking	0	7	6
Drying and stacking	0	3	0
Carried forward	£8	5	6

Brought forward		£8	5	6
Rent	£1 10 0			
Tythes	0 8 0			
Parish charges	0 5 0			
	2	3	0
	£10	8	6

Produce.

Thirty-five stone, at 7*s.*	£12	5	0
Sixteen strike of seed	4	16	0
	£17	1	0
Expences	10	8	6
Profit	£6	12	6
To which should be added the bounty granted by Parliament 3*d.* per stone	0	8	9
Total	£7	1	3

In Russia, Prussia, and Poland, it is generally understood that Flax and Hemp render more profitable crops than any other sort of grain.

Supposing a piece of ground put into the usual state of cultivation for bearing a crop of Hemp, and that the other sorts of grain it would then be fit to carry are barley and peas; if we value the seed and produce in the proportions which the prices of these articles generally bear to one-another, the calculation will stand thus:

	Florins.
Four sheffels of Hemp-seed would produce about ten stone of dressed Hemp, which, valued at six florins, will be worth	60
And eight sheffels of seed, at fl. 3	24
Together, in Prussian money,	84

	Florins.
Brought forward	84
And deducting the seed which was sown, *viz.* four sheffels, at florins 3 - - - - - - - - - - -	12
There would remain, as the gross produce -	72
Now, if on the same extent of ground there could be raised three sheffels of Barley, rendering fifteen sheffels, value three florins each - - - - - - - - - - - -	45
Deducting the seed, three sheffels at 3 florins - - - -	9
There would remain, as the gross produce -	36
Or, two sheffels of Peas, rendering a crop of twelve sheffels, valued at four florins - - - - - - - -	48
And deducting the seed, two sheffels at four florins - -	8
There would remain -	40

as the gross produce: which, allowing the tow of the Hemp for the straw of the barley and peas, shews a *plus*, on the gross produce of a crop of Hemp, against a crop of Barley, of about fifty; and of Peas, of about forty-four per cent.

It is indeed true, that the cultivator, individually considered, does not gain the whole, nor perhaps any thing more than a very small proportion of this gross surplus: but whatever may remain to him as a neat profit, the whole is clearly a public gain; since the excess goes for manual labour, necessarily incurred by the extra means of cultivation. And this gain is of the more importance, as arising on articles of importation, on which the very existence of the nation depends.

Durno.

ESTIMATE of the Produce and Expence of an Acre of Land, cultivated with Hemp, in Nova Scotia.

Produce.

	£	s.	d.
Ten hundred-weight, at 35*s.* per cwt. - - -	17	10	0

Expences.

First ploughing, 7*s.* 6*d.*; second and third, 8*s.* -	0	15	6
Three harrowings - - - - - - -	0	6	0
Two bushels of seed, at 12*s.* - - - -	1	4	0
Sowing, covering seed, and water-furrowing -	0	5	0
Pulling, eight days work, at 2*s.* 6d. - - -	1	0	0
Drying and bundling, two days - - - -	0	5	0
Watering, grassing, drying, and housing - -	1	0	0
Carting to and from the water, say one mile - -	0	10	0
Dressing ten hundred weight, five days work per hundred-weight, 2*s.* a day - - - - - - -	5	0	0
Rent of land - - - - - - - -	1	0	0
Total Expence -	£11	5	6
Clear profit per acre	£6	4	6

In this calculation abundance of labour is allowed, and large prices for that labour, particularly for the dressing, which is the heaviest expence. In the winter season labourers might be paid and fed for half the wages allowed, and would soon, I think, do more work. Yet, after deducting all expences and rent of land, here is a clear profit, exceeding the whole produce of an acre of the best wheat.

W. C. Tonge, Esq. in Annals of Agriculture.

BENGAL.

SUNN,

The Profit attending its Cultivation, compared with Grain, Cotton, Mulberry, Indigo, or other staple productions of the Country.

BENARES.—The same ground being used for the hemp, barley, and wheat, it may be necessary to observe, that the former has been hitherto less profitable to the farmer than wheat or barley: for the price has been generally the same: but a begah will produce of either of the latter about eight maunds of grain; add to which that the straw is valuable, whereas in Hemp (Sunn) there is no more than about three maunds produced from a begah.

The profit attending the cultivation of Hemp, compared with grain, has already been mentioned: but to draw a comparison between it and cotton, indigo, or other staple productions of the country, is very difficult to do with any degree of accuracy.

It has yet only been cultivated for home-consumption, so that there is no saying how the price might be affected if it were to become an article of export; and as it is cultivated without much risk or trouble, it is but reasonable to suppose, if it were to become so, that the cultivation would be increased; and in proportion to the increased demand for it, the price would probably rise, in the same manner as the price of Indigo has risen from sixty and seventy-five to one hundred and twenty and one hundred and eighty rupees per maund, and that of Sugar from six to nearly eight rupees per maund.

COMMERCOLLY.—Hemp is cultivated here only by the fishermen, for their nets and ropes. It is reckoned a very unprofitable article, and for that reason no more is cultivated than what is wanted for the above purpose.

HURRIAUL.

HURRIAUL.—The following is a Statement of the Profit attending the Cultivation of Hemp, compared with that of Grain.

Hemp (Sunn.)

	S. Rup.	An.
Estimated produce per acre	8	7
Deduct: Charges of ploughing, &c. — S. Rup. 1	8	
Cost of seed — 0	12	
Rent of ground — 1	8	
Charges of cutting and preparing for market — 3	12	
	7	8
Profit per acre	0	15

Grain.

Estimated produce per acre	9	4
Deduct: Charges of ploughing, &c. — 1	14	
Cost of seed — 0	9	
Rent of ground — 1	8	
Charges of cutting and preparing for market — 4	11	
	8	10
Profit per acre	0	10
Profit in favour of the cultivation of Hemp	0	5

HURRIPAUL.—Land sown with Sunn yields a less profit than any other article would; yet the Riotts will readily cultivate it, because it requires little labour, is of quick growth, andless ed pendent upon the seasons than other articles.

MALDA.

MALDA.—The following appear to be the rates of profit attending the cultivation of Hemp, and of the other staple productions of the country.

	Per Begah. Rupees.			Per Acre Rupees.		
Hemp, from	1	to 2½	or	3	to	7½
Rice	1	- 1½	—	3	-	4½
Copass	2	- 3	—	6	-	9
Mulberry	5	- 6	—	15	-	18
Sugar-cane	3	- 5	—	9	-	15
Indigo	1½	- 2	—	4½	-	6

KEERPOY.—The farmers prefer growing other articles, such as rice, mulberry, sugar-cane, because they are in more demand, and in consequence a greater advantage arises from them.

The following is a statement of the expence of growing Sunn, and of the probable gain to the farmer.

	Rup.	An.	Pice.
Rent of begah	2	0	0
Hire of three ploughs	0	6	0
D° of ten coolies for dressing the ground with hoes	0	12	6
Twenty seers of seed	1	0	0
Hire of fourteen coolies for cutting, washing, and cleaning the Hemp	1	1	6
	5	4	0
Produce of a begah, five maunds, at Rs. 1. 8	7	8	0
Gain	2	4	0

Bengal Board of Trade Cons. 24th August, 1792.

DACCA DISTRICT.

BAZETPORE.—The Chassars derive no profit from this article, and therefore do not cultivate it. The Jelluahs (fishermen), for the purpose of making nets, sow a sufficiency of it for their own occasions. They give the Chassars for rent and labour at the rate of one rupee four annas per begah: the Jelluahs also provide seed. The Chassars prepare the ground and sow the seed: the Jelluahs watch the plants and reap the harvest. The Chassars then sow ouze-paddy on the ground.

The expence per begah of a Hemp-ground is as follows:

	Rup.	Ann.
Rent and labour of Chassars	1	4
Watching, taking up the plants at the time of harvest, separating the Hemp, and other expences	2	8
Seed	1	8
	5	4

The labour of cultivating grain is greater than that of Hemp, but not the profit.

TEETBADDY.—After the expence of cultivation is paid, the Chassars derive a profit at the rate of from 1 R. 8 A. to 1 R. 12 A. per puky. The labour of cultivating Hemp is less than that of grain or coppas, and the profit greater.

CHAUNDPORE.—The expences attending the cultivation of a Cauny of Hemp-ground (Sunn-ground) are as follows:

	Rup.	Ann.
Seed	4	12
Rent for twelve months (deducting for six months not applied to the cultivation of Hemp (Sunn)	3	0
Ploughing	7	0
Cooly-hire	3	0
	17	12

After defraying these charges, the proceeds of the sales of the Hemp leave the Chassars a profit of three or four rupees per cauny. On the same ground, grain is sown six months of the year.

SERAMPORE.—Grain is less profitable to the Chassars than Coppas, and Coppas than Hemp (Sunn). The following is a statement of the expence and profit attending the cultivation of a begah of Hemp (Sunn):

	Rup.	Ann.
Rent	1	0
Ploughing, &c.	2	4
Seed	2	0
Total expence per begah	5	4
The produce, about two maunds ten seers, selling on an average at three rupees per maund, yields	6	12
Leaving a profit per begah, after paying the expence of cultivation	1	8

But a begah of grain yields only a profit of four annas; and a begah of Coppas a clear gain of only twelve annas.

DACCA-JELALPORE.—The profit arising from the cultivation of Coppas is greatest. Next to that is the profit of Hemp (Sunn); and after Hemp (Sunn) the profit of grain.

MOMENSING.—The Chassars (husbandmen) do not cultivate Hemp: that is done by Jelluahs (fishermen) for their own occasions.

The expences of culture are estimated as follow:

	Rup.	Ann.
Ploughing	0	12
Seed	1	4
Coolies	0	14
Rent	1	0
Total	3	14

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The profit remaining after paying the charges is supposed to be 2 Rupees 2 Annas per begah. The profit of grain is not superior to that of Hemp (Sunn).

TIPPERAH.—The quantity of Hemp sown is small, but the profit is considerable. It is not inferior to the profit arising from the culture of either coppas or grain.

JUNGYPORE.—An acre of Ghore-Sunn is estimated to yield to the cultivator, after defraying the expences of rent, ploughing, cutting, &c. a clear profit of current rupees 3 . 3 . 4 . 2. The land appropriated to its growth is by no means favourable for either grain, cotton, mulberry, or indigo; nor would any of them produce a profit equal to the Ghore-Sunn in such situations.

The following is a statement of the expence attending the cultivation of an acre of Ghore-Sunn.

	Maunds.	Seers.	Chittucks.	Rup.	Ans.	Gun.	Cow.
Seed required	1	9	8				
Cost of seed				2	0	9	2
Ground rent				1	12	14	1
Charges of preparing the land				1	11	16	3
Cutting and dressing				4	5	12	0
Total expences				9	14	12	2
Quantity produced	8	17	7				
Value of the Produce				13	1	17	0
Profit				3	3	4	2

Board of Trade Cons. 14*th January*, 1793.

KEERPOY.

	Rup.	An.	Gund.
KEERPOY.—The profit per begah being - -	3	5	10
is more than that of grain by - - - -	1	9	10
But the profit of a begah of Hemp is exceeded by that			
of a begah of Mulberry by - - - -	8	6	10
D° - - Cotton - - - - -	0	15	10
D° - - Wheat - - - - -	0	10	7
D° - - Cullie - - - - -	0	10	0
D° - - Mustard-seed - - - -	0	9	18

BAHAR.—Produce and Expence of one Begah of Ground, yielding one Crop of Hemp (Sunn) per Annum.

Expence.

	Rup.	An.	Pice.
Eight ploughings - - - - - -	0	12	0
Twenty seers of seed - - - - - -	0	9	0
Fifteen weeders - - - - - - -	0	11	6
Ten reapers - - - - - - -	0	10	0
Five for putting Hemp-plants in water - - -	0	5	0
Ten for cleaning do. - - - - - -	0	10	0
Twelve boys for drawing out the sticks from the Hemp	0	7	0
	4	0	6
Ground-rent for the whole year - - -	3	0	0
Total expences	7	0	6
Average produce, maunds 6 10, at 1 rupee 12 annas per maund - - - - - -	10	15	0
Profit per begah	3	14	6

	Rup.	An.	Piee.
The net profit of a begah of Flax is - - - -	6	1	6
D° - - Wheat - - - -	1	3	9
D° - - Indian corn and wheat - -	0	7	0
D° - - Barley on high lands - -	0	14	0
D° - - Indian corn and barley - -	0	3	0
D° - - Barley in low grounds, near tanks and by the sides of rivers -	3	1	0
D° - - Boot-gram - - - -	1	12	3
D° - - Indian corn and Boot-gram -	1	6	9
D° - - Cotton, first sort - - -	6	7	6
D° - - Cotton, second sort, and Indian corn	2	10	3
D° - - d° third sort, and d° -	0	8	9
D° - - Opium - - - -	6	11	6
D° - - Indian corn and Opium - -	2	11	6

In the above estimate, which is formed upon the calculation of a single begah through the whole year, the profit to the Riott on the cultivation of flax appears so superior to the advantage arising from cultivating many other articles, even the necessaries of life, that it might be supposed he would apply himself entirely to the cultivation of Flax and Hemp: but, as there is very little demand for these articles, the cultivation is in proportion; and therefore it yields such a profit to the cultivator; and a Riott, who cultivates one begah of Flax or Hemp, cultivates ten or twenty begahs of grain.

Bengal Board of Trade Cons. 14th Jan. 1793.

	Rup.	An.	Pice.
CHITTAGONG.—Rent of a Cauny of Ground per Year,	2	0	0
Ploughing, &c. - - - - - - - -	1	0	0
One man to watch - - - - - - - -	3	0	0
	6	0	0
Produce from 3 to 4 maunds at $2\frac{1}{4}$ to $2\frac{1}{8}$ Rupees per maund, say $3\frac{1}{2}$ at 2 Rupees 2 Annas, per maund -	7	7	0
Profit - - - - - - - - - -	1	7	0

Board of Trade Cons. 14*th January*, 1793.

SOONAMOOKY.—If it will thrive on poor lands of the rent of from one Sicca-Rupee to one and one-eighth per begah, the cultivation will be profitable; but if the rich lands are required, it will only be a secondary object, as it must be grown on lands now in use for Cotton and Sugar-cane, and can only be extended at the expence of those articles, which, being profitable, are not likely to be abandoned for a precarious cultivation. Cotton and Sugar-cane are cultivated alternately; the Resident thinks a crop of Sunn may be obtained between the Cotton and Cane, as is sometimes now done with Indigo.

Board of Trade Cons. 17*th July*, 1801.

PART II.

ON HEMP AND SUNN,

THE

PREPARATION THEY REQUIRE TO RENDER THEM MERCHANTABLE.

Of Drying preparatory to Steeping.—Watering or Retting.—Drying after Watering.—Mode of separating the Fibres from the Stems. —A new Mode of doing this, recommended by the Abbé Brulles.— Hint for a Second Watering to avoid Breaking, by Mr. Marcandier. —Scutching—Beating—Heckling.

HEMP AND SUNN,

THE METHOD OF PREPARATION REQUIRED TO RENDER THEM MERCHANTABLE.

IN the former Part, HEMP and the SUNN of Bengal have been considered as productions of the soil: I shall next proceed to a description of the various processes they undergo, before they are considered in a marketable state.

OF DRYING, PREPARATORY TO STEEPING.

FOR the seasoning of Hemp, as soon as you have pulled it, you must lay it all along, flat and thin, upon the ground, *for a day and a night at the most, and no more;* and then tie it up in bundles, and rear them upright upon the ground, till you can carry them to the water, which is to be done as speedily as may be.

England's Improvement.

The karle Hemp, after pulling, is bound in bundles of a yard in compass, according to statute measure, *which are laid in the sun for a few days to dry,* when it is stacked up or housed till the seed can be thrashed out. In drying, however, it may be sometimes necessary to use artificial means; but where these are used, the utmost care must be taken; Hemp, when dried, being exceedingly inflammable. As the Hemp thus dried must afterwards undergo precisely the same process

as

as when fresh gathered, it is evident, that this operation ought never to be used but in cases of necessity; as it is impossible to make Hemp, which has been dried previous to its being steeped or watered, so white, as that which has been worked green.

Chambers's Dictionary.

When the first Hemp is pulled, it should be tied with a band of rushes, in pretty large sheaves, and set up on end, in shocks of four sheaves, *where it must remain for twenty-four hours before it is watered.*

The female, or seed Hemp, is managed in the same manner; only, on account of the seed, it must be allowed to stand longer before it is put in the water: but to remedy even that inconveniency, the seed-pods may be cut off, and dried upon frames.

M'Donald's Essay.

After pulling up the stalks of the male Hemp, they are laid *in the sun to dry* the leaves and flowers, which, when well dried, are beat off by striking each handful against a tree or wall. Several of these handfuls are then put together, so as to form pretty large bundles; and in this condition they carry them to the watering-place.

Du Hamel.

Notwithstanding what Du Hamel has related, regarding the drying of Hemp before watering, I must observe, *that it is a matter of doubt, whether this plant should be dried before it is steeped.* Those who are for drying it first, say, that the Hemp becomes thereby stronger, than when it is steeped without having been previously dried. For my part, I confess, that this drying seems to me to be a needless trouble; for, as it is necessary in the steeping of Hemp, that a certain degree of putrefaction should arise, sufficient to destroy the texture of that glutinous substance, which connects the fibres to the woody part of the

Hemp,

Hemp, it certainly is more adviseable to lay the Hemp in the water as soon as can be after it is pulled; because, the more there is of the natural moisture left in this glutinous substance, the sooner the putrefaction will begin. If, either by design or accident, the Hemp has been dried, the putrefaction comes on more slowly and more unequally, and the fibres contract a hardness, which the steeping afterwards will not easily correct.

Mills's Husbandry.

In some places, after binding the small bundles with the worst stalks of Hemp, *they expose them to the sun, to dry the leaves before the Hemp be watered;* and when they are dry enough, they cause them to fall off, by striking every bundle against a wall or tree, or the ground. But this does not appear to be the best method, because, besides that it multiplies toil and labour, it also exposes the Hemp to many accidents when the season happens to be rainy. The water which falls on the Hemp before it is dry, makes it of a blackish colour, and full of spots. This inconvenience may be avoided, by observing a method, which to us appears to deserve the preference. When the Hemp is perfectly ripe (for this is a circumstance absolutely necessary to attend to), it must be put into the water as soon as it is pulled out of the ground: its gum, which then is in some respect in a state of fusion, will consequently be the more quickly dissolved. In this condition it will not require to be more than four days in the water; whereas, when it is not watered till after it is dry, it is a matter of much greater difficulty to dissolve it, and it must be in the water eight or ten days, and sometimes more, according to the seasons. Warm water forwards the effect of watering, and cold retards it.

Marcandier.

After the plant is pulled and bound, it should, if possible, *be*

 worked

worked while green; the Hemp thus produced being much finer than that which is previously dried. The reason of this is, that the plant contains a great quantity of glutinous matter, which being once dried, agglutinates the fibres in such a manner, that they can never be afterwards perfectly separated. The Female [*read* Male] Hemp, however, is always in smaller quantities than the Male [*read* Female], and therefore, where the crop is large, it will be impossible to work the whole as fast as it is pulled or cut.

Encyclopædia Britannica.

Hemp should be watered as soon as possible after being pulled; because, by drying the mucilage hardens, and requires a more severe operation to develope the bark, than when macerated immediately after being pulled, and which must prove injurious to the fibre.

Geo. Sinclair.

BENGAL.

HEMP-PROPER—*Cannabis sativa.*

When the Hemp flowers, which is in about four months after being sown, the stalks should be pulled up, and *exposed a day or two to the sun,* and then tied in bundles.

Mr. Fleming, Gov.-Gen. Cons. 5th May, 1801.

SUNN.

Mr. Fleming in describing the Method of Preparing Sunn, as practised by the Natives, says, The plants, after they are pulled, are immediately put into water, where they are left to steep for three or four days.

By this mode of putting the plants into water as soon as they are pulled up, without *previously drying them in the sun,* and by letting them remain so long a time in the water, the strength of the fibre is much diminished;

diminished; but the Natives use it to save trouble, as the fibres, in this way, separate easily, without requiring them to be bruised or heckled.

Instead of this, he recommends the plants, after pulling, to be *first dried in the sun for two days*, after which they should not be let remain in the water more than forty hours.

Bengal Cons. 5th May, 1801.

Mr. Douglas also observes; when the seed is nearly ripe, the plant should be pulled and *exposed to the sun for two or three days to strengthen the fibre*. It should then be tied up in bundles for watering.

Bengal Cons. 5th May, 1801.

COMMERCOLLY.—The Resident, after relating that there are two descriptions of Sunn, the Phool and the Boggy, says, the Phool-Sunn, after being pulled and bound, is immediately carried to the water, and then for a day or two *kept standing on their root-ends, in an inch or two of water*, which allows the fibre to obtain a proper degree of *firmness*, without suffering it to be parched by the heat of the sun. The next day they are immersed in water, &c. [See WATERING.]

The Boggy Sunn is treated in the same manner; except that it is left to *stand two days on its root-ends*, as above.

The Fishermen [Manjees] and others, who cultivate the Sunn, all declare, that if they adopt the mode prescribed by Mr. Fleming, or, as it is termed, the *European mode*, in contradistinction to the method practised by the Natives, the quality will be injured and the produce lessened: for experience has taught them, that this is the case, whenever through want of time or neglect they have swerved from their own method, by either steeping it too little or too much, as also when the Phool-Sunn is left for *two* days standing in the water, instead of *one*. They say, when the latter is the case, the plant requires much longer soaking, and near a quarter of the Sunn is wasted, which I imagine arises from the plant containing a great quantity of glutinous matter, which on being once dried, agglutinates the fibres in such a manner that they can never afterwards

wards be perfectly separated*. He conceives their mode of cultivating and preparing the Sunn to be as good as can be proposed.

Board of Trade Cons. 12*th June*, 1801.

LUCKIPORE.—The Sunn for fishing-nets is *dried more in the sun, and not steeped so long in the water,* as the Sunn sold at market.

Board of Trade Cons. 17*th July*, 1801.

CHITTAGONG.—The Resident acquaints the Board, the Natives declare the fibres of the Sunn cannot be separated from the stem, with forty hours steeping, or if it is *previously dried.* He means to persevere, and hopes to overcome their scruples.

KEERPOY.—The Resident says, the mode prescribed by Mr. Fleming does not appear, upon trial, to answer. He has tried it himself, and prefers the mode practised by the Natives.

SANTIPORE.—The Resident observes, he is fearful the Natives will not pay sufficient attention to the preparation in the mode prescribed: he therefore suggests a proposition, to purchase the plant, and prepare it at the Cooties. When dried, it will keep any length of time. The Board do not approve of the suggestion, as they fear the quality might be injured by drying†.

SOONAMOOKY.—The Resident thinks, that the strength depends on the *previous drying,* and that the period of steeping is immaterial. He sends samples that were all *dried* two or three days before steeping.

Board of Trade Cons. 11*th September*, 1801.

Mr. Frushard, in a Letter to the Bengal Board of Trade, pronounces the system of preparing Sunn, as laid down by Mr. Fleming, to be highly erroneous. His objections lie, first, to the *drying the article before watering;* secondly, *the insufficiency of the time of watering;* and, lastly, the manner of *separating the fibre from the reed after watering.*

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* The Resident seems to have formed this opinion from consulting the Encyclopædia Britannica. Vide page 126.

† Supposed to mean, by remaining so long in a dried state after gathering, before it is worked. R. W.

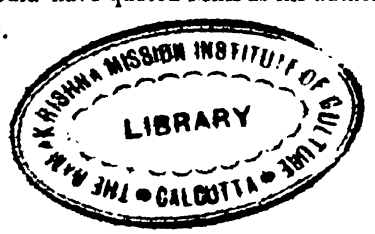
On *the drying before watering* he observes: "It is agreed by all, that the shorter time the plant is left in the water, the better it is for giving strength to the fibre.

"Marcandier (says he) found three or four days sufficient, *if the plant was put in green.* They do no more here; but the plant, when dried, requires eight or ten days. The same author considers it as a natural consequence, that when the plant is put into the water green, with the juices still circulating, their adhesive quality must be less, and the separating the fibre from the reed, from the outer pellicle as well as from itself, must be greatly accelerated thereby."—Du Hamel, he observes, says it is a notion only the fibres gain strength by *drying* before steeping; as the glutinous matter which connects the fibre with itself, with the reed, and with the outer skin, is more readily dissolved, by putting the plant into water as soon after it is out of the ground as may be; and that when the plant is *dried* before putting into the water, the separation not only comes on more slowly, but more unequally*, which is a great defect; and that, moreover, some plants obtain a hardness by *drying*, that no soaking afterwards will correct: and be it remembered, as before-stated, that the Hemp thus steeped, has always been found to give more long Hemp, or of the first sort, after heckling, than that they got from the Riga, and that the ropes also made with their own Hemp last longer.

How the custom of *drying before steeping* obtained, Mr. Frushard remarks, doth not appear. He conceives it to have originated in the paltry œconomy of saving the seed, which, after all, is found only to be fit for the feeding of poultry, and not proper for sowing, as has been

 proved

* I do not find in the Edition of Du Hamel (1747), that I consulted, any thing like this. I rather think Mr. Frushard should have quoted Mills as his authority, instead of Du Hamel.—Vide pages 124 and 125.



proved by M. de Chateauvieux, who from forty chosen plants, taken from a plantation devoted to Hemp, obtained no more than a pound and a half of indifferent seed, whilst a single plant which grew by itself yielded seven pounds and a half of the very best.

For the above reasons, Mr. Frushard objects to the mode of *previous drying*. The practice of the Natives, says he, is against it. They are to to be convinced. One of them said to him, to *dry before steeping* was doing to undo. Another observed, he wanted to make difficult what was easy.

In a postscript to his letter, he quotes the authority of Abbé Brulles, in proof, that the Hemp should be watered *when green;* as Hemp thus prepared is finer than when obtained from the plant after its having been previously *dried*. It is, he adds, allowed by all, the finer the fibre the greater the strength.

In proof of his position, he produced a sample of Sunn, made by himself after the Native method, without *drying previous to steeping*, but steeped for three days and nights, which he asserts is equal in strength to any that was ever seen; as also a line made from Santipore Sunn, stronger, he adds, than the Hemp tried at Woolwich [*vide* Head of EXPERIMENTS]; and from this infers, that the want of strength is to be attributed more to the carelessness, impositions, and knavery of the Natives, than to any radical defect in the growth and curing it.

Alluding to this experiment, he says, It is self-evident, that *drying before watering it* will not do; nor will the fibre separate with the plants remaining forty hours in the water: three days and three nights are barely sufficient, without *drying* it first.

The general practice, he observes, is to set the plant upright in the water, immersed about one-third only from the bottom, for one day before the complete immerson.

In

In further confirmation of the inefficacy of *drying the plant before watering*, he states, that on the 4th August, 1801, he obtained a small bundle of ripe Sunn, which he dried till the 6th. On that day, at gun-fire, he immersed it in the water. On the 8th he took it out, to try if the fibre would separate from the reed, but found it impracticable. On the 9th he tried it again, but without effect. On the 10th he found it separate from the reed, but not from itself; at the same time that it was quite perished.

On the 18th August, he says, The *drying system* is again proved to be worse than nugatory.

By another Letter, dated the 26th August, 1801, Mr. Frushard stated to the Board of Trade, that the Sunn was then ready for cutting, but that the Riotts considered the orders for *drying it before steeping*, and steeping it only *forty hours*, next to impracticable, from its taking so much more trouble to separate the fibre from the reed than under the usual mode of practice. This, they said, would of necessity occasion the latter part of every parcel to remain so much longer in the water than the parcel they begin upon, that it must inevitably be over-steeped, become more tender, and likely to perish altogether.*

The several objections urged against the system of preparation laid down by Mr. Fleming, as contained in the Letters above-stated, having been submitted to the perusal of that gentleman, he addressed a Letter to the Board of Trade, in which he informed them, that on the subject of *drying the plant before it was steeped*, he adhered to his original opinion of *its giving strength to the fibre*. As to the period of watering, *forty hours* might perhaps be too short; but certainly *three or four days* was

* These letters of Mr. Frushard were not recorded on the Board of Trade Cons. till the 12th September, 1801. I have inserted the above extracts from them, in this place, because it appears Mr. Fleming had seen them before he made his Report, on the 8th September, 1801.

was too long: the exact period must be ascertained by experience. With regard to the method of *separating the fibre from the reed,* he thought it might be left to the discretion of the Residents, to relax or not in the method prescribed, as they should see necessary. The Board thereupon issued fresh Instructions to the Residents, in conformity to Mr. Fleming's Report.

Board of Trade Cons. 8th September, 1801.

The Board also, on the 12th September, on which day Mr. Frushard's Letters are recorded, remark on the experiments made by him, that they think them useful, but offer some solid reasons why they do not deem them conclusive. (*Vide* the Head of EXPERIMENTS, where these reasons are stated at length).

It appears from the Board of Trade's Consultations, 12th September, 1801, that Mr. Frushard undertook to make a practical trial upon forty begahs of Sunn growing in his own neighbourhood, by preparing a part of it in the way prescribed by Mr. Fleming, and the remainder after the method practised by the Natives; but that he failed, owing to the unfavourableness of the season. He made three efforts, but was disappointed each time by the rain, which prevented him from *drying the plant before steeping;* and again, from *drying the fibre after separating it from the reed,* which made it tender. He remarked, that the plant in his neighbourhood was of a puny growth, being not thicker than good wheat-straw, and of course not well suited for comparison with the Up-country plant, which is so superior.

He again cited the authorities of the French professors, as to the *drying before watering* not being productive of any good, while at the same time it is attended with many inconveniences, from its taking the water irregularly.

The Board of Trade observe, that, upon a review of all that Mr. Frushard has offered on the subject, they see no reason to make any deviation

deviation from the amended instructions as issued on the 8th September, 1801. To which he must pay due attention.

Mr. Frushard, upon this, addressed the Governor General in Council, on the subject of his objections to the method of preparing Sunn, as laid down by Mr. Fleming, who transmitted a copy of his letter to the Board of Trade, and desired to be furnished with their sentiments thereon. The substance of the Board's Reply will be found in a subsequent part of this Work, where the whole of the reasonings, both for and against the system, will be brought forward in one point of view.*

RUNGPORE.—The Natives now think, that from the plant being *put so soon into the water*, and kept so long therein, the Sunn *may* be weakened.

SOONAMOOKY.—The Riotts, at first, declined to engage in the new mode of preparing Sunn. They were of opinion, that it would be impossible to separate the fibre from the stem, after the first drying had taken place; but being at length convinced, that their ideas on this head were erroneous, he entertained hopes, that they would have prepared it properly; but an inundation taking place, succeeded by rains, the drying plan was prevented. The experiment, nevertheless, has been tried by some, but on the worst of the plant. It has convinced them, that it can be done, and that the Sunn is stronger.

Board of Trade Cons. 1st January, 1802.

DACCA.—The superiority of the Sunn made at Amerabad is partly owing to the good quality of the soil, and partly to its being steeped in the clear water of the Megna, which is fresh at Amerabad. The plant was steeped only about twenty pars (two days and a half), more or less, but not exposed to the sun *before* or *after* drying.

Board of Trade Cons. 13th July, 1802.

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* Vide Objections to the Mode of preparing Sunn, as prescribed by Mr. Fleming.

HEMP,

WATERING, *or, as it is sometimes termed,* RETTING.

AFTER the Hemp is pulled and made up into bundles, it is immersed in a pool, or other stagnant water, where it must remain five or six days to *rot the bark* so that it may the more easily be separated from the reed. A stream of running water would do the business much better; but this is prohibited by law *, as it is found to impregnate the water with its injurious qualities.

Chambers's Dictionary.

The steeping of Hemp is absolutely necessary, in order to separate the bark, which is properly the Hemp, from the reed or woody part. In Suffolk, this operation is called *water-retting.* But sometimes a mere exposure to the air is substituted in its place, turning the Hemp frequently during the time it is exposed: this is called *dew-retting,*; but the former method is universally deemed preferable. Dew-retted Hemp is generally stacked and covered during the winter. In January and February it is spread upon meadow-land, and whitens with the frost and snow; though it is always much inferior to the other, and proper for the coarser yarns only.

The length of time required for steeping Hemp is various; a complete knowledge of it can only be obtained by practice. Standing water is preferred, and the same water will steep Hemp three times during the season; but the first has always the best colour.

The

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* Vide Act 33 Hen. VIII. ch. 17. and 6. Geo. 3.

The slenderest Hemp requires the most soaking. The operation is known to be finished, by the reed separating easily from the bark.

Encyclopædia Britannica.

I am of opinion, that Hemp should be *watered as soon as possible after being pulled*, because by *drying* the mucilage hardens, and requires a more severe operation to develope the bark, than when macerated immediately after being pulled, and which must prove injurious to the fibre. The male plants, therefore, should not be kept till the female plants are pulled, nor should they be steeped together; because the male being more delicate than the female, the fibre will be disengaged by a less degree of fermentation. I recommend stagnant water for Hemp.

Geo. Sinclair.

Hemp is always water-retted. Clay-pitts are preferred to any running water. The pits require being cleaned out once in seven or eight years. An acre of three small waggon-loads are laid in one bed. They will water five times in the same hole; but it is thought by some too much. If it is necessary to wait, they pull as the hole is ready, not chusing to *leave it on the land after it is pulled.*

It is generally four days in the water, if the weather is warm; if not, five: but they examine and judge by feeling it. The expences are from twelve to fifteen shillings per acre.

Suffolk Report.

Hemp, when left for seed, is seldom water-retted; but, I am of opinion, it would be better if so done. It is generally stacked and covered during the winter, and is spread upon meadow-land in January or February. If the season suits (particularly if covered with snow) it will come to a good colour, and make strong coarse cloths. It is much inferior to Hemp pulled in proper time and water-retted.

The

The custom of many places is to *dew-rett* their Hemp, that is, to spread it on meadow-land as soon as pulled, and turn it frequently; but this is a very bad method of retting it, as the bark will not come off completely: it therefore requires more violent means of bleaching the yarn, and consequently diminishes the strength. It is, likewise, much sooner injured in rainy seasons than Hemp *water-retted*. Water-retting is performed, by binding the Hemp in small bundles with the under Hemp when pulled, and, *as soon as may be*, placed in rows crossing each other in the water, and immersed. Standing water is deemed the best. It requires four, five, or six days steeping, till the outside coat easily rubs off, and is then spread on meadow-land, and turned frequently until finished. The same water will not be proper for receiving Hemp more than three times in a season; and the first water always produces the best colour in the least time.

A Stow Market Manufacturer.—Suffolk Report.

Hemp, when pulled and bound, is conveyed to a pond of standing water (if a clay-pit the better,) where it is laid bundle upon bundle, direct and across. This is termed a bed of Hemp; and after it is piled to such a thickness as to answer the depth of water, which cannot be too deep *, it is loaded with blocks and logs of wood, until all of it is totally immersed. After remaining in this state four or five days, as the weather shall direct, it is taken out and carried to a field of aftermath or any other grass for drying.

Rev. Mr. Mills of Bury.—Suffolk Report.

Any

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* This deserves experimental inquiry. Watering Hemp is a partial rotting through fermentation: the vicinity of the atmosphere must for that purpose be necessary. The best Hemp-ponds I have seen have not exceeded the depth of five feet.

A. Young.

Any water will do for retting. If the weather is warm, they leave it two weeks; some longer: and when, on examination, they find it retted enough, they load it on slades and carry it for grassing.

At Haxey, after immersion it lies in the water for two or three weeks, according to the weather. Running water is very bad for it.

Lincoln Report.

As soon as the seed has been gained, the Hemp is immediately put into the steep, and so carefully sunk, that no part of it may remain above the surface of the water, and there left until the rind of the stalks begin to scale or break up, and disjoin itself from the harle.

If the weather is warm, and the water soft, nine or ten days are generally sufficient for that purpose; but in hard water, and cold weather, between fourteen and twenty-one days may be necessary.

Stagnant is preferred to running water, not only as producing the same effect in less time, but also because running and spring water make the harle red and towey: and of stagnant water large are preferred to small bodies, because they have been found to give the harle a clearer or whiter colour.

Fish-ponds must be avoided, because the fish would be destroyed; and also such places as cattle are watered at, if they are so small as that the whole mass may be impregnated, since it would then be not only unpalatable but unwholesome.

A slimy or muddy bottom for the steep is preferred, and such only avoided, for being particularly prejudicial, as are either morassy or metallic, or as appear to contain cold springs.

In the southern parts of Poland, steeping is not practised at all, on the supposition that the harle is thereby weakened, and the colour darkened; but experience seems to have ascertained, that it does not

produce either of these pernicious effects, unless improperly managed: as, for example, by using hard instead of soft water, or letting the mass lie too long in the steep. Instead of steeping, they there *dry the stalks* in the *sun:* but as, in this case, the dressing is more laborious, consequently more expensive, and also attended with more brakage of the harle, there is the less reason to doubt of the mode of steeping being the best, as it is known to be almost universally adopted; in that part of the countries in question, in which these articles are cultivated of the best quality, and to the greatest extent.

Durno.

All that are employed in the cultivation of Hemp, know how it is commonly laid down to be watered. It is covered with a little straw to keep the dirt from sticking to it, and loaded with pieces of wood and large stones, or other heavy materials, that it may be always five or six inches below the surface of the water.

As the physical effect of watering was not formerly inquired into, errors prevailed, the consequences of which were not perceived. The watering of Hemp producing only a proportional dissolution of a certain quantity of the gum, which joins all the fibres of the Hemp together, and attaches them to the stem; it is of some consequence to observe, where, when, and how this dissolution is effected. The finest and clearest water is always the best. Some make a kind of ditch on the edge of a river, where the water, being more still and warm, ferments easily, and penetrates more quickly the parcels of Hemp that are laid in it. When they are taken out of this ditch, it will be sufficient to wash them in the current of the river, which will carry off all the gum and mud that would otherwise cleave to them. The Hemp that is watered in rivers is always the whitest and of the best

best quality. That which we are obliged to lay in ditches, pools, or reservoirs of standing water, and unfit for the purpose, is always of a bad colour and very disagreeable smell, loaded with dirt, and looses a great deal in the dressing.

In whatever manner this operation is performed, we know that the Hemp is sufficiently watered when the bark is easily separated from the stem. This we find out by drawing out every day a few stalks for trial. It would be dangerous to let the Hemp lie too long in the water; the fibres of the bark, too much divided by an undue dissolution of the gum, would not have strength enough to stand the effort they must sustain, when the Hemp is peeled or braked; and a great part of it would remain with the stems, and be lost in the braking.

It is therefore necessary, for this very reason, to leave the Hemp no longer in the water, than is sufficient to separate the bark from the stem, accurately and without loss. The same precaution must be used with the Hemp that bears the fruit or seed, and remains for ordinary five or six weeks on the ground after the other is pulled, that it may come to perfect maturity. This delay is far from being of any prejudice to the plant, as some have imagined. The bark, as it ripens, acquires all that force and resistance which is suitable to its nature, and becomes preferable, especially for the construction of ropes, which cannot be too strong or too solid.

Marcandier.

Having recited what Marcandier has stated on watering, as above, Mr. Mills, in his Practical Husbandry, adds, "The judiciously accurate Memoirs of the Society, which the illustrious States of Britanny have established for the improvement of Agriculture, Commerce, and Arts, are more particular in this respect, and consequently more satisfactory.

After

After observing,* that it is still undetermined, whether Hemp ought to be steeped in running or in standing water, that each cultivator of this plant gives the preference to the method he has been used to follow, and that naturalists have not yet written any thing decisive in the choice of the waters fittest for this preparation (the most important of any that Hemp undergoes, because it is on this that the ease and goodness of the heckling, spinning, and fabrication, in a great measure depend);—the Memoirs, I say, of these zealous patriots, inform us, that one of the Members of their Office, at Rennes, thought that this diversity of opinions and customs might proceed, from running water being in fact always preferable in some cases, and from standing water being always the best in others. For example, in cold and rainy years, the plants must be weaker, longer green, and fuller of juice than in dry years, in which last, the Hemp will be stronger, but at the same time harder and more woody: why then, say they very judiciously, should it be expected that the same water applied to so different productions should have a similar effect upon each?

To remove all doubts in this respect, the Society ordered some Hemp to be pulled in different parts of the Province of Britanny, and in different states of growth. Some was pulled before it was ripe, some exactly when it was ripe, and some several days after it was ripe. Each of the parcels of these three sorts of Hemp was divided into two equal parts, one of which was laid to steep in running water, and the other in standing water. They were afterwards heckled with very great care, and examined with the most scrupulous attention by a person thoroughly acquainted with the defects and good qualities of this commodity.

Minute

* Corps d'Obsevations de la Société d'Agriculture, de Commerce, et des Arts, établie par les Etats de Bretagne.—Années 1757 et 1758.

Minute accounts of every circumstance attending these experiments, and of their result, were sent to the Office at Rennes; and the Society, sensible of the vast importance which the ascertaining of this point may be of in many respects, desired that they might be repeated, in one and the same year, on the Hemp of all the districts of the province. Unfortunately, these trials were not made when the Britanny Society did me the honour to send me a copy of their valuable Observations for the years 1759 and 1760. In the mean-time, the result of their first experiments was as follows:

1. There was a sensible difference between the same Hemp pulled in the three states before-mentioned. 2. The Hemp which was pulled before it was ripe acquired the greatest degree of whiteness. 3. All the Hemp that was steeped in running water, was incomparably whiter than that of the same quality which was steeped in standing water. 4. The whole of the loss of substance, upon summing up the waste occasioned by each particular preparation, was least upon the whitest Hemp; but that which had been steeped in standing water yielded a greater quantity of fine fibres, and the great losses in point of quantity fell only upon the first dressing. 5. The Hemp, which was judged to be the best before it was heckled, did not always preserve its superiority when heckled: that which was at first looked upon as a middling, or even of an inferior quality, proved to be the finest and best after it was heckled. This observation is of great importance, especially when the Hemp is intended for naval uses.

"We shall not," add these truly intelligent patriots, "limit our inquiries to a bare repetition of these experiments: we purpose to extend them farther, in order to have facts which may be entirely relied on. We shall cause the best and best-prepared of each different kind of Hemp to be spun, by the same hand, into as small and fine thread as

the Hemp is capable of affording, that so we may judge, to which of the different manners of steeping this plant the preference is due, by the greater division of which its fibres may be susceptible. These threads shall be exactly weighed, and shall undergo similar preparations, in exactly similar leyes; after which they shall be weighed again, in order to judge of their goodness, by the diminution which each shall have suffered in the leyes, and by the degree of whiteness which each of them shall acquire. These experiments, though extremely useful in themselves, are however only introductory to a greater enterprise. They will lay a sure foundation for the improvement of every manufacture of Hemp, and particularly of sail-cloth, which is an article of the utmost importance to all commercial nations."

The excellent Memoirs of the Royal Society of Agriculture at Tours, for the year 1761, prefer river-water, especially that of rivers which run upon a bed of sand, as the best for steeping of Hemp; because this water being clear, renders the colour of the Hemp brighter than it would otherwise be, as there is not any filth therein to sully it, and it peels the more easily when so steeped, not being there liable to so great a degree of putrefaction, as to break the cohesion of the fibres of its bark. It is not, however, here meant, that the Hemp should be steeped in the bed of the river; because the inequality of the motion of the water on the sides and in the middle of the Hemp would prevent the arising of that equal degree of putrefaction, which is in this case essentially necessary. On the side of such rivers a hollow should be dug, three or four feet deep, and proportioned in extent to the quantity of the Hemp to be watered.

As it is contrary to law, that the places for steeping of Hemp be made in running water; it would be of advantage to contrive them so, that the waste water from the steeping-places should run off upon pasture grounds;

grounds; because the quantity of putrid vegetable matter which the water, wherein Hemp has been steeped, carries along with it, would greatly enrich those grounds: and with this view, likewise, all the water of pools, and other places used for the steeping of Hemp, should be thrown out of them upon the grass, as soon as the Hemp has been removed.

The surest way to distinguish whether the Hemp has been steeped enough, is, as the Tours' Memoirs remark, to take some of the stems out of the water, and to try whether the extremity of the roots snaps off short, and whether the bark separates clear from the reed its whole length; for in these cases it is certain, that the Hemp has been sufficiently watered, and it should then be immediately taken out. If the bark does not separate equally from the reed, but stops chiefly at the small knots which appear on the stem, this shews that it has not been steeped enough. The usual duration of the steeping of the male Hemp is from three to six days, according to the weather; and of the female Hemp, from five to eight or ten days: but as only a small degree of too much or too little steeping is equally hurtful, the utmost attention should be exerted, to hit the precise time of its being duly watered.

Some injudiciously neglect to wash their Hemp when it is taken out of the water; because, say they, the filth brought out of the water with it will afterwards fall off: but in the drying of the Hemp, this filth gives it a bad colour, and the dust which arises therefrom is extremely prejudicial to the health of the workmen.

Mills's Husbandry.

When the bundles are made up lay them in the water. A running and clear water is much the best; and if shaded and overhung with trees, the better. Lay poles or planks, or whatever else you have that is suitable, across, a large number together, so as to keep them at least

two

two inches under water. Take particular notice which you lay in first, and how you lay the bundles in order, that you may be able to get them out successively, as they were laid in, without breaking or entangling. At the end of six days visit the Hemp, and see whether the reed will draw out from some of the bundles. The time required for soaking depends very much on the nature of the Hemp, the weather, and of the water it is soaked in, from six days to nine, or even eleven. It is a trouble that is not ill-bestowed, to sort the Hemp for soaking, if it is of unequal sizes; the slenderest generally requiring most soaking.

Abbé Brulles.

The place called the steeping or rotting-place, or where the Hemp receives the preparation called steeping or rotting, is a ditch, three or four *toises* in length, two or three toises in breadth, and three or four feet deep. These ditches must be filled with water. The water is sometimes supplied by springs; in which case an outlet must be made at top, by which it discharges itself when full.

Some of the steeping-places are only ditches dug on the margins of rivers. Some farmers, notwithstanding the severe laws forbidding that practice, steep their Hemp in the beds of the rivers. When the grounds are situated at a great distance from springs or rivers, they steep the Hemp in pools and ditches full of stagnant water. Let us now proceed to examine, what is the intention of steeping the Hemp in water.

The method of laying the Hemp down, in order to its being steeped, is to place it in bundles at the bottom of the water, to cover it with a little straw, and then to load it with pieces of wood and large stones to keep it down, so that it may be constantly under water.

It is left in the water till the bark (which furnishes the fibre) parts easily from the reed, which is in the middle. That you may know when it is sufficiently steeped, you must try some of the stalks from

from time to time; and when you find the bark no longer adheres to the reed, but separates from it without difficulty, the Hemp should be taken out of the water.

The process of which we now are speaking, effects something more than disposing the fibrous bark of the Hemp to separate readily from the reed: it renders the fibres finer and softer. But to enable the reader to conceive how the water produces this effect, it is necessary he should be acquainted with the organical disposition of a stalk of Hemp, which I shall accordingly endeavour to describe as briefly as possible.

The stalks of Hemp are hollow within, or only filled with a soft pith. This pith is surrounded by a tender, brittle, woody substance, which is called the reed: over this reed we find a thin bark or rind, composed of fibres extending in a parallel direction along the stalk: this bark adheres pretty strongly to the reed; and the longitudinal fibres of which it is composed, are joined together by a vesicular or cellular web; the whole being covered by a very thin membrane, which Botanists call the epidermis.

The intention of steeping the Hemp in water is, to make its bark part the more easily from the reed, and to destroy the epidermis or outer-skin, and a part of the cellular web, which connects the longitudinal fibres. All this is effected by only a small degree of putrefaction; so that it is dangerous to let the Hemp lie too long in the water; for it will then be over-steeped, that is to say, the water will not only have acted upon the epidermis and the connecting fibres, but likewise have produced a change in the longitudinal fibres: in short, the Hemp will be too much rotted, and in this case the strength of the fibres or threads will be proportionably impaired. On the contrary, when the Hemp has not lain long enough in the water, its bark continues to adhere

to the reed; the fibres are harsh, elastic, and cannot by a subsequent process be rendered sufficiently fine. There is, therefore, a medium to be observed; and this medium depends, not only on the length of time that the Hemp is to remain in the water, but also, 1. On the quality of the water; it being sooner steeped sufficiently in standing water than in a running stream, and sooner in stagnant putrid water than in that which is clear. 2. On the temperature of the air; for it requires less time to be sufficiently rotted in warm weather than in cold. 3. On the quality of the Hemp; that which has been raised on a rich soil, where it has not wanted for water, and which has been pulled whilst yet a little green, being sooner steeped to a proper degree, than that which has grown on a stiff or dry ground, and which has been let stand till it was too ripe.

In general, when the Hemp has been steeped but a short time, its fibres are thought to be the better. Hence arises the opinion, that Hemp should not be steeped but in warm weather; and for this reason, also, it is, that many, when the autumn is cold, defer the steeping of their female Hemp till the next spring. It is, likewise, for the same reason, that some prefer steeping their Hemp in standing water, or even in stagnant water that is putrid, rather than in spring or running water.

I have steeped Hemp in different sorts of water; and it appeared to me, that the fibres of the Hemp steeped in putrid standing water were softer than those of that which had been steeped in running water: but in water which does not run, they contract a disagreeable colour, which does not, indeed, do any real injury to the Hemp; for that which has been thus steeped is afterwards the most easily bleached. But yet, as this colour displeases, and the Hemp is the less saleable for it, endeavours are always used, if possible, to make a small stream of

water

water pass through the steeping-places, thereby to change the water in those places, and to prevent its becoming putrid.

I succeeded, likewise, in rotting Hemp by spreading it upon a meadow, in the same manner as is practised for bleaching of linen; but this method is tedious and troublesome; nor did the fibres of the Hemp, so prepared, seem to differ much from those of Hemp steeped in the common way.

I have also tried the boiling of Hemp in water, in hopes of bringing it speedily to the same condition as it is when taken from the usual place of steeping: but when, after having been boiled upwards of ten hours, it was taken out of the water in order to be dried, it was not at all fit for peeling. It is true, that while it yet remained hot and wet, its bark separated easily from the reed; but then it peeled off like a ribbon; the cellular web, which connects the longitudinal fibres, and makes them adhere closely to each other, not being at all destroyed, so that they could not be separated, nor was it possible to divide them into fine threads. It is evident, from what has now been said, that no precise time can be fixed for the duration of the rotting process; since the quality of the Hemp, that of the water, and the temperature of the air, hasten or retard this operation.

The common method of judging when the Hemp has been sufficiently rotted, is by trying whether the bark parts easily from the reed, and can be peeled off its whole length without breaking; for in this case it is thought to have been watered enough. However, it must also be allowed, that long practice enables the peasants who cultivate Hemp, to give it generally a due degree of steeping, though they do sometimes mistake: and it is also to be observed, that it is the constant custom of some countries to steep their Hemp more than others.

It

It is essential to observe, that the Hemp be not, by any means, laid to steep in water in which there are animals apt to gnaw it; as some insects cut the fibres asunder, and render them almost useless. Of this kind in particular, are what the French call *Chevrettes*, or fresh-water-shrimps.

It is a common opinion, that Hemp intended for the manufacture of fine cloth, should be rotted more than that intended for coarse cloths; and that the Hemp intended for the making of ropes should be steeped or rotted least of all.

We have observed, that Hemp, which is not sufficiently steeped, is harsh, coarse, elastic, and remains encumbered with the boon: and we shall see, in the sequel, that these are very great defects in Hemp intended for the manufacture of good ropes.

I must grant, however, that Hemp intended for fine works may be rotted rather more than other Hemp: but it is vain to hope greatly to improve by this process fibres which are naturally coarse: they would indeed perish by putrefaction, if left too long in the water. A fine fibre cannot be obtained without the concurrence of several circumstances.

1st, The soil; for, as we have already remarked above, too strong or too dry soils never produce fibres of superior softness or fineness: on the contrary, they are too woody, and consequently harsh and brittle. But if the Hemp-ground be too wet, the bark of the Hemp produced on it will be herbaceous, tender, and easily broken, so that there will be too great a proportion of tow and waste when dressing it. It is soft, rich, and moderately wet soils, which produce a smooth, flexible, and strong fibre—the most desirable qualities in Hemp.

2d, The seasons; for in hot, dry seasons, the fibres are harsh: on

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the contrary, they are supple, and sometimes tender, in cold, wet seasons.

3dly, The degree of ripeness. If the Hemp have been left too long standing on the ground, the longitudinal fibres of the bark adhere too strongly together, so that it comes off the reed like a ribbon, and is very difficult to divide. This defect is generally found in all the female Hemp, which has stood too long on the ground, for the purpose of ripening the seed. On the contrary, if the Hemp be pulled too green, the bark being still of an herbaceous nature, there is a good deal of waste, as the fibres have not attained a sufficient degree of strength.

4thly, The mode of sowing; for if it be sown too sparingly, the bark will be thick, hard, knotty, and woody; while, on the contrary, Hemp sown sufficiently close, produces fine bark or fibres.

5thly, On the preparatory processes which it undergoes, *viz.* Braking, Beetling, Scutching, and Heckling.

Du Hamel.

Lay it in some deep stagnant water; and in six days' time, it will be found properly watered. However, a deal depends upon the season and nature of the water.

M'Donald's Essay.

The operation of water-steeping or water-rotting Hemp is performed by placing the Hemp, which had been previously made up in bundles about the thickness of a man's thigh, *after drying it in the air*, in a pond, containing about five or six feet deep of water, and free from mud. The bundles of Hemp should be laid therein across each other, and close together, part of the heads one way, and part the other; the whole covered with water, and kept underneath it by stones, weights, or levers, till properly steeped, which may be known by taking out a bundle

dle and washing it. If the leaves come off freely, the coat opens, and easily separates from the rind or stalk, it is enough; if not, it must lie longer, under careful observation, till ready. When the Hemp is found to be sufficiently steeped, the bundles must be taken out, one by one, and washed, to separate the filth and loose particles. It should then be set on the root-ends to drain, the bands be untied, and the Hemp placed against a fence exposed to the sun and air, that it may be thoroughly dried.

Where the convenience can be had of filling a pond with water, and letting it off at pleasure, such a situation should be preferred, but otherwise a common pond will answer.

In warm weather, this operation of the water-steep may be performed in four or five days; in colder weather, it will require eight or ten; and in very cold weather, eighteen or twenty days may be necessary.

The intent of this process is, by a gentle fermentation, to separate the gummy and mucilaginous matters from the fibres of the Hemp, with which they are intermixed, and to occasion the bark or rind on the outside of the fibres to be more easily detached by the brake.

Taylor's Instructions.

It appears certain, that the process of watering or retting Hemp in India has a material influence over the quality of its fibre. In a hot climate, where the whole time in which the process is performed does not amount to one-fourth of what is necessary in a cold one, it is evident, that it must be infinitely more difficult to ascertain, with accuracy and precision, the actual moment when the bark is sufficiently rotted, and the fibre still uninjured. In Europe, it is probable that the period of this process may be continued for some days too long, with less damage to the fibre than will happen in as many hours in India.

India. I am therefore directed to call the attention of the Court of Directors to this point, and to recommend to them to give orders to the English Hemp-dressers, in order to ascertain the best mode of practice for retting in the different seasons in which the Hemp-harvest of India may be collected.

Letter from Mr. Fawkener, Secretary to the Lords of the Privy Council, for the Affairs of Trade, to the Court of Directors of the East-India Company, 4th February, 1803.

" In Russia, Sweden, and Livonia, where there is much snow, they rot the Hemp in winter under the snow. After the first fall, they spread the Hemp (which has been dried in the sun or otherwise) on the snow, and leave it there to be covered with other falls of snow until spring, when it is usually found to be sufficiently rotted. They then collect it into handfuls, for breaking, or peeling by the hand, or for breaking by mills where the quantity is great." *

BENGAL.

HEMP.—*Cannabis sativa.*

The Hemp, *after being exposed a day or two to the sun,* and tied in bundles, should be steeped in water from *forty* to *fifty* hours, according to the state of the plant, which may be known by examining when the fibre parts easily from the stalk.

Mr. Douglas, Bengal Consult. 5th May, 1801.

SUNN.

BENARES.—When the Hemp (Sunn) is cut, it is thrown into water, where it remains eight or ten days; then it is taken out, and the

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* I was favored with this information by the kindness of Sir John Sinclair, Bart.

the Hemp being separated from the stalks, and well dried and cleaned, it is fit for use.

HURRIAUL.—The stalks of the Hemp (Sunn) must be laid in water for *fifteen days*, in which time they become soft, and the fibres separate. They must then be well washed in clean water, and afterwards placed in the sun to dry, after which they are fit for use.

HURRIPAUL.—As soon as it is cut, it is put under water for four days, some earth being put on it to keep it under. On the fifth day it is well washed and cleaned, the next day dried in the sun, after which the bark is taken off, when it is again dried in the sun. This is the whole process, nothing remaining but to tie it in bundles ready for the market.

MALDA.—The stalks of the Hemp (Sunn) are tied up in small bundles, about the circumference of two spans, and thrown into standing water, the more stagnant and foul the better. The bundles are then tied together, and covered with leaves of trees and earth, so as to sink them about a foot below the surface of the water. They remain there till the bark of the stalk is well rotted, which requires more or less time, according to the virtue of the water; but it is generally effected in four days. The bundles are then taken up and washed; from ten to twenty of the stalks, according to their thickness, are taken in the hand (they floating on the water) well bruised from the root, nine inches upwards, and afterwards broke at that distance, of which the bark easily slips off, leaving the Hemp, which being used as a handle, the stalks are worked about in the water, till the remaining part of the bark disengages itself at the other end, leaving the Hemp (Sunn) in the workman's hand. The Hemp (Sunn) is then put into the sun to dry, tied up, and fit for use.

RUNGPORE.

RUNGPORE.—In August, the plants are cut, tied up in bundles, and laid ten or fifteen days in water. The bark or rind is then stript off, well washed, and beat about in the water, and afterwards dried in the sun. In this state the Hemp (Sunn) is carried to market, and any further operation of cleaning is performed by the manufacturers, according to the uses to which it is meant to be applied. The inner wood is used by the cultivators, either for fuel or temporary fences to their habitations.

Board of Trade Cons. 24th Aug. 1792.

DACCA DISTRICT.

BAZETPORE.—The Hemp (Sunn) is thrown into water *three or four days* to rot. The plants are then taken out of the water and beaten: after this they are taken in handfuls, and the bark and fibrous parts about the roots separated by a *churny* or comb. They are then *dried a day in the sun;* after which the bark and fibrous parts being sufficiently loosened, the stalks of the plants are pulled out, and the Hemp (Sunn) which remains, having been again *dried in the sun,* is packed up in bundles.

DACCA JELALPORE.—The Hemp (Sunn) is steeped in water *ten or twelve days;* at the end of this time the plants rot. After rotting, they are well shaken in the water; the parts of the plants then separate. The stalks are thrown away, and the fibrous parts which remain, are Hemp (Sunn).

TEETBADDY.—The Hemp (Sunn) is tied into bundles, and thrown (the tops of the plants being cut off) into water. After *six or seven days* on the plants rotting, they are taken up, and beaten on the water, and washed. They are then exposed to the sun; and after being sufficiently dried, the stalks are separated from the Hemp (Sunn) which remains.

MOMENSING.—The Hemp (Sunn) plants are cut down and steeped in

in water: in *four or five days* they rot; they are then well washed in the water. The fibrous parts are separated from the stalks, and on being dried in the sun, the process of making Hemp (Sunn) is completed.

CHAUNDPORE.—The Hemp (Sunn) is tied together in small bundles, and thrown into water for *four or five days:* the plants are then washed, and the Hemp separated from the stalks. The Hemp (Sunn) is afterwards dried in the sun, and made up into bundles.

TIPPERAH.—The Hemp (Sunn) is tied up into small bundles and thrown into the water to rot. After *six or seven days'* steeping, the plants are taken out, broken in two, and beaten on the water. This operation separates the green bark, the white fibrous parts, and the stalks. The fibrous parts, which are the Hemp (Sunn), are then collected and exposed to the sun, and on being perfectly dry are tied up in bundles.

SERAMPORE.—The Hemp (Sunn) is put into water, and kept under by weights. After *three days*, the plants are taken up, made into small bundles, and broken in two: they are then beaten on the water and washed, and the stalks separated. The Hemp (Sunn) which remains is afterwards washed, dried in the sun, shaken, and cleared.

SYLHET.—The Hemp (Sunn) is made into bundles, and thrown into water. After steeping *four days*, the plants are taken out and washed, the stalks separated, and the Hemp (Sunn) collected.

JUNGYPORE.—The plant, after being cut down and bound into bundles, is immediately laid under water, from *two to three days:* by this operation the green bark is rotted, and the plant is separated from it by washing and beating on the water. It is then laid in the *sun an hour or two;* and when half dried, the Hemp (Sunn) is separated from the woody part of the plant by the hand, *dried in the sun*, and carried to market, or laid by for use, without any further preparation.

KEERPOY.—

KEERPOY.—The Hemp is cut and laid to soak for *one month;* * when the rind getting rotten and easily separable, it is beat against a board, until it is fit for use.

PATNA.—When the plant is cut, it is bound in bundles of the size of the grasp of a man's two arms, put in water, and kept under water for *three days,* covered with mud, which prevents the bundles from rising above the water, and contributes to make the interior bark separate more easily from the stems. After three days, the cuttings are taken up, and well beaten in the water, which clears them from the mud and the exterior bark, and leaves only the interior bark, which is the Hemp (Sunn), upon the stems or sticks. When the cuttings are sufficiently cleared from the exterior bark and mud, they, with the interior bark on them, are put in the *sun to dry;* and when *dried,* the stems or sticks are drawn away singly, with the hand, from within the interior bark, which then becomes Sunn, and is ready for use.

CHITTAGONG.—When pulled, it is tied in bundles, and put into a tank, or standing pool of water, for *five or six days,* so that the bark may be easily separated from the stalk.

Board of Trade Cons. 14th January, 1793.

The plants, after being pulled up, are put into water, where they remain from *three to four days.* The dresser, standing in the water, takes up a handful of the plant, and breaking it in the middle, strikes one end of it on the water, until the fibre separates from the stem: he then does the same with the other end.

By this mode of putting the plants into water as soon as they are pulled up, *without previously drying them in the sun,* and by letting them

* Must be an error. R. W.

them remain *so long a time in the water*, the strength of the fibre is much diminished; but the Natives use it to save trouble, as the fibres, in this way, separate easily from the stem, without requiring to be bruised or heckled.

Instead of putting the plants into the water immediately after they are pulled up, they should be previosuly *dried in the sun for two days*; after which they should be steeped, but not allowed to remain in the water *above forty hours*.

Mr. Fleming.

After *drying* the plants, they should be steeped in water about *forty hours*, according to the state of the plants, which is known by the manner in which the fibre parts from the stalks. This is to be found by frequent examination while the plants are in the water.

The fibre of the Sunn is injured by the Natives watering it too much.

Mr. Douglas.—Bengal Cons. 5th May, 1801.

COMMERCOLLY.—When the plants of the Phool-Sunn are pulled and tied in bundles, they are immediately carried to the water, and there for a day or two kept standing on their roots, *in an inch or two of water, which allows the fibre to obtain a proper degree of firmness, without suffering it to be parched by the heat of the sun.* The next day they are laid in the water, with a quantity of grass or mud over them, to keep them down; in which situation they remain for *three* or *four* days, when a man, conversant in the business, attends to see if they are soaked enough, as *too little* or *too much soaking* injures the quality of the Sunn. When the bundles are taken out of the water, the rind, or outer covering, is instantly separated from the Sunn, which is done by beating on each bundle with a large bamboo. This loosens the rind; when it is finally separated with the hand, and by beating about in the water.

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The Boggy is treated in the same method; except that the bundles are kept standing in the water *two days*, and require *four or five days steeping*. An objection is made against the mode prescribed by Mr. Fleming for Watering, which is stated under the head of DRYING BEFORE WATERING [*Vide page* 127.]

Board of Trade Cons. 17th July, 1801.

LUCKIPORE.—The Sunn for fishing-nets is dried more in the sun, and not kept *so long in the water* as the Sunn sold in the market.

SOONAMOOKY.—The Natives urge the time of *steeping* is too short to admit of the fibres separating easily.

Board of Trade Cons. 27th July, 1801.

CHITTAGONG.—The Natives are obstinate and stupid. They declare the fibres cannot be separated from the stem, if the plant is *steeped* only *forty* hours, or if it is *previously dried*.

KEERPOY.—The Resident says, the mode of preparation laid down by Mr. Fleming does not answer: he has tried it himself, but finds the mode practised by the Natives is preferable. Thinks it better to let the Natives prepare it in their own mode.

SANTIPORE.—The mode of preparation does not differ materially from that in use.

The Resident thinks, that strength will be obtained if the Riotts follow the prescribed directions with regard to the *steeping*: but in so extensive a district, it will be impossible to see that they all do this in the way directed, as some may steep the plant longer, for the sake of the parts dividing with more ease. An effectual way of seeing that the preparation is properly conducted, will be to engage with the Riotts for the plant, as they do for Indigo, deliverable at the different Cooties; and that the operation of Steeping, Scutching, and Heckling, be performed at the Cooties. When the plant is well dried, it can be kept any length of

time without detriment, and the process would be the same as if it were fresh gathered.—The Board fear this mode would injure the plant by drying: but desire he will try the experiment, and report the result.

SOONAMOOKY.—The rain has destroyed all the plants; but if it had not, the Riotts would not have prepared it in the way required. From the result of some experiments made by himself, the Resident thinks the strength depends on the *previous drying*, and that it is immaterial whether it is *watered* for *forty* or *sixty* hours, as this is only required to prepare it for peeling, as soon as the separation readily takes place, which in some cases may be *forty hours or longer*, as the state of the weather or the plant may happen to be.

Board of Trade Cons. 8th September, 1801.

It has been already observed, under the Head of DRYING BEFORE WATERING, (page 128), that Mr. Frushard was decidedly adverse to the mode of preparing Sunn, as laid down by Mr. Fleming.

With regard to the time of steeping, after reciting what M. Du Hamel has said on the watering of Hemp, (*vide* page 146) that it will be sooner steeped in standing water than a running stream; in stagnant putrid water than in that which is clearer; and that the plant grown in a rich moist soil, and pulled before it is quite ripe, will not require so much soaking, as when it has been sown in a stiff dry soil, and suffered to stand till it is ripe; he adds, "Thus, from Du. Hamel and "others, it is impossible to prescribe even the number of *days*, much less "*hours* for *steeping*, since the quality of the plant, the quality of the "water, and the temperature of the air, are all liable to accelerate or re-"tard the operation." The surest way is to follow the directions of the Society of Tours, that is, to take some of the stems out of the water, and try whether the roots will snap short off, and whether the fibre separates readily

readily and clearly from the reed, in its whole length, in which case it is certain, that the plant has been sufficiently *steeped*, and should be immediately taken out of the water. If it separates unequally, and stops chiefly at the small knots which appear on the stem, this shews it has not been *steeped quite enough*.

When the Duke de Choiseul was Minister for Foreign Affairs in France, the States of Brittany solicited of him, that the Ambassador at the Russian Court might be directed to obtain an account of the method practised by the Livonians in steeping the Hemp-plant. The common method, it seems, was to make holes, as near the spot of its growth as might be; but the plant so steeped produced a Hemp that always sold from twenty-five to thirty per cent. less, than when steeped after their better method thus described:

The Livonians choose a spot where there is a fall of clear water, and there make five or six basons, one under the other, at the most two feet deep. These basons are only separated by slight banks of clay, in which a small aperture is easily made, and stopped up at pleasure; and by these means the water is let off from one to the other. They put the plant first into the uppermost bason: at the end of two or three days they remove it into the second, and so on to the last. At each steeping the first bason is filled with fresh plants, and the water removed in all the basons. It is further said, that the English and Dutch import no Hemp from Riga that hath not been steeped after this manner.—But I do not, says Mr. Frushard, find that the French ever availed themselves of this information: and indeed this method seems complicate, without any adequate good resulting from it, and it approaches too much to running water, which all condemn. We have not much more, therefore, says he, to fear from leaving the plant *three or four days* in the water, as is the practice with the Natives, than we have from not *dry-*

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ing the plant before steeping, or that the arcanum of strength lies any more with the one than the other.

All seem to agree in having little more water than to cover the plant; whereas the Natives generally steep their plant in tanks, where there is greatly more than sufficient: and this may be one reason why the steeping is not so soon effected, as a strong infusion of the plant, endued with such powerful qualities, may possibly be found to accelerate the dissolution of the gummy cement, which combines all together, much more than a weak one.*

In a postscript, he cites the authority of the Abbé Brulles, to prove the plant ought to be watered when *green*; as Hemp thus produced is finer, than when prepared from the plant after being previously *dried.* It is allowed by all, the finer the fibre the greater the strength. When the fibre is forced off the plant before it is steeped enough, the Hemp proves coarse, stubborn, and elastic, which to an unexperienced observer passes for strength; but is only so in appearance. He submits a sample made from the plant, which had been steeped three days and three nights, which was hardly sufficient: it is as strong as any that was ever seen. [*Vide* Head of EXPERIMENTS.]

By the trial thus made, it is self-evident, that drying the plant before putting it into the water will not do, nor will the fibres separate with the plants remaining *forty hours* in water: *three days* and *three nights* are barely sufficient without *drying it first.*

The fibre is separated from the reed in two modes: the one is performed in the water, the other on land. When done in the water, the fibre

* Does the *Crotolaria Juncea* give out the same qualities on infusion as the *Cannabis sativa?* R. W.

fibre is full of the reed; but when on the land, scarce any thing is to be seen.

The HEMP, the SUNN, and the PAUT, are different plants, and each requires a management peculiar to itself. The Hemp can never do with from *six to eight*, and even more than *ten days* watering, and is not easily prejudiced by leaving it therein a day more or less.

The Paut requires a *fortnight*, and even *twenty days* does it no harm: but the Sunn is more delicate; it is dangerous to exceed *three days and three nights* by only five or six hours.

The general practice is to set the plant upright in the water, immersed about one-third only from the bottom, for one day, before the three days complete immersion.

10*th August.*—In confirmation of the inefficacy of *drying* the plant before steeping, on the 4th instant I obtained a small bundle of ripe Sunn, which I dried till the 6th. On that day, at gun-fire, I immersed it in water. On the 8th I took it out, to try if the fibre would separate from the reed, but found it impracticable. On the 9th I tried it again, but it would not do. On the 10th (this morning), I found the fibre to separate from the reed but not from itself, at the same time that it was quite perished.

18*th August.*—The impracticability of reeding the plant after steeping no more than *forty hours* is again confirmed; and the *drying* the plant, so contrary to the first authorities, is again proved to be worse than nugatory, creating delay where expedition is required.

The experiment hath verified, that the Sunn requires a far more delicate management, and a much nicer degree of attention, than the real Hemp-plant: *five or six hours only* too long in the water, and all is lost. The greatest care, then, must be taken, that no more plants be immersed in the water at one time, than can be readily worked off

in the course of half a day. The Natives are aware of this, and frequently examine the plant while in the water; but I find them prone to err, in leaving the plant to the latest minute: and this not so much to save trouble, as to accelerate the operation of reeding, well knowing, that the latter part of their work is likely to be injured by every hour's delay. They should be encouraged to begin a little before, rather than at the very exact moment it may be said to be ready.

Their method of placing the plant upright in the water, immersing the stronger part for only one day before the weaker end, speaks for itself, and is a proof, that they are not wanting in sagacity.

But their practice of covering the plants with sods, and other rubbish, while in the water, is of no use whatever: on the contrary, it mixes with the plant, makes it dirty, and requires more time than they are willing to allow (however necessary) to cleanse it all away; but by steeping in clean water, and keeping the plant down a foot below the surface with bamboos, all their additional trouble is saved, and detriment to the plant avoided.

Mr. Frushard adds, It is in cleaning the fibres he finds the Natives are most liable to fail. It should not only be strongly insisted, that they beat the plant (by handfuls at a time) on the surface of the water, and which is best performed in the River, to rid it of all the filth and mucus with which it abounds after steeping; but moreover, when the fibre is separated, it must be well washed, by repeatedly squeezing the water out of it, and ultimately be well wrung, to accelerate the drying, which is most essential to restoring that degree of strength the fibre hath lost in being severed from the plant. Conformably with the first authorities, any remains of gumminess being left to dry in the fibre, give it the appearance of strength, but in reality make it brittle.

24*th*

24th August, 1801.—Mr. Frushard sends a white line made from Buddaul Sunn [see Head of EXPERIMENTS], whiter and clearer than any he ever saw, which is the effect of its being *thoroughly steeped*; and adds, it confirms all he has said on the mistaken notion of steeping *only forty hours*, and consequently leaving the fibre charged with the gummy substance, giving it the appearance of strength to the hand, but in reality rendering it naturally less strong when put to the test of a rope.

On the 26th August Mr. Frushard stated, that the season for cutting was arrived. That the Riotts consider the orders for *drying before steeping*, and *steeping only forty hours*, as next to impracticable, from its taking so much more trouble to separate the fibre from the reed than under the usual mode of practice. This, they say, will of necessity occasion the latter part of every parcel to lie so much longer in water than the parcel they begin upon, that it must inevitably be oversteeped, and less tender, and most likely to perish it altogether; as also, that to dry the plant on taking it out of the water, before separating the fibre from the reed, will occasion a much greater loss in tow. That they never practise this method but when they are distressed for time, and under the dread of leaving it too long in the water, when any parcel proves too large for the labourers employed in one day. He desires to know if he may deviate or must conform to the advertisement, which specified the mode in which it is to be prepared.

The Letters from the several Residents above-mentioned, containing the objections that were urged against the mode of preparation laid down by Mr. Fleming, having been submitted to that gentleman's perusal; he addressed a letter to the Board of Trade, in reply thereto; in which, in regard to *watering*, he observed, that although *forty hours* steeping might, perhaps, be found too little, yet certainly *three or four days* was too much. The exact period must be ascertained by experience.

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The Board of Trade, accordingly, issued fresh Directions, allowing the Residents a latitude to deviate from the original Instructions as to *watering*, as in their own discretion they should see fit.

It has been mentioned, under the Head of DRYING BEFORE WATERING, that Mr. Frushard failed in his intended experiment of preparing Sunn after the Native and the European modes of practice. He again argues, from the experiment of the white line made from Buddaul Sunn [*vide* Head of EXPERIMENTS], that the arcanum of giving strength to the fibre does not lie in the little steeping; as from the extreme whiteness and clearness it was, beyond all doubt, most thoroughly steeped and divested of the gummy substance; while all agree, that the *drying before steeping* can answer no good end. Were these two notions to be insisted upon with the Natives, it would occasion such delay as would inevitably risk the greater part of the crop; for if it is not made and dried off-hand, it is sure to lose proportionably of its strength, even to rottenness, besides enhancing the price, from the more than double or treble labour it will occasion them.

The Board of Trade, on the 8th of September, Resolve, that Mr. Frushard's Experiments were useful, but not conclusive [*vide* Head of EXPERIMENTS]; and on the 12th, after duly considering his observations, record it as their opinion, that they see no reason to make any alterations in their Instructions, as amended on the 8th of that month: notice of which was ordered to be communicated to Mr. Frushard accordingly.

Mr.

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* Vide a preceding observation, under the head of *Drying before Watering*.

Mr. Frushard, upon this, addressed the Governor General in Council, stating his objections to the system laid down by Mr. Fleming; part of which are to the *watering it only forty hours*, which he asserts is insufficient. The Governor General forwarded this Letter* to the Board of Trade, and desired to be furnished with their sentiments thereon. Their Reply will be found under the Head of OBJECTIONS TO THE MODE OF PREPARING SUNN AFTER THE MANNER LAID DOWN BY MR. FLEMING; where the whole of the reasoning, for and against the system, will be brought forward in one point of view.

RADNAGORE.—The whiteness and weakness of some Sunn, produced at that factory, is imputed to its having been over-steeped.

Board of Trade Cons. 4th Dec. 1801.

COMMERCOLLY.—The Resident says, The Sunn sent by him is of different colours, some reddish, some a dirty brown, and some white, but all are equally strong. The white being purer and clearer than the other, he agreed to pay a higher price for it, and for the rest in proportion. The Board of Trade remark, that the whole is of an indifferent quality. The white they suppose to be over-steeped: Sunn of that colour they have observed to be generally weak. They cannot account for the reddish and dirty colour; but desire the Resident will ascertain and report the mode in which the Sunn of those colours has been prepared.

Board of Trade Cons. 11th Dec. 1801

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* Mr. Frushard's Letter, and the Board of Trade's Reply, are recorded on the Board of Trade's Consultations, 8th December 1801.

COMMERCOLLY.—The Resident, in reply to the Board's Remarks as above, states, that the inferiority of his Sunn was occasioned by the inundation, which swept away the whole of every species of cultivation: the fields were from four to six feet under water. To save the plants, the Riotts took them up before they were ripe: this and the injury the fibres sustained by being so long under water, and the damp which prevailed when the Sunn was preparing, occasioned the inferiority, and the different colours of white, reddish, and dirty-brown.

SANTIPORE.—The Resident sends a sample of two bales made by himself, as an experiment, to ascertain which mode of preparation had the preference.

The *chaul*, or outer-bark, of these was removed, by striking the bundles of plants on the water a few times after the steeping was completed: and this seems to be the only method by which it can be effectually done.

Board of Trade Cons. 1st June, 1802.

DACCA.—The inferiority of some Sunn from Luckea is attributed, partly to the soil, and partly to the plants having been steeped, at the time of the preparation of the Sunn, in standing water of tanks and jeels, covered with vegetables, which in a putrified state are supposed to injure the water.

The weakness of the Dumroy Sunn, is attributed to the length of time in which, according to the usage of the district, the plant is steeped at the time of preparing the Sunn.

The superiority of the Amerabad Sunn is partly owing to its being steeped in the clear water of the Megna, which at Amerabad is fresh. The plant is steeped only about twenty pars, (two days and a half), more or less, but is not exposed to the sun before or after the watering,

watering, prior to its being made into Sunn, which takes place while the plant lies in the water, where the bark is separated from the stalk, by beating the plant with a broad stick.

DUMROY.—The Resident says, the Natives manifested the most inflexible obstinacy; and although he sent a person to instruct them in the new mode, who shewed them that it was practicable, they still refused to deviate from their custom. They exclaimed, "*You may imprison our persons, you may strike our necks, but never will we make Sunn according to the Advertisement.*" As a last expedient, he proposed, that, if they would steep the plant according to the Advertisement, the drying it after steeping should be dispensed with. This was partially acceded to, and some has been prepared accordingly: but at that time all the Sunn had been cut; and the Muster which was sent, was of Sunn prepared according to the latter mode, and arrived in a very ill-cleaned state, full of stalks, and appeared to be much inferior to the Sunn made in the Country way.

Board of Trade Cons. 13th July, 1801.

Dr. Roxburgh, the Superintendant of the Company's Botanical Garden at Calcutta, in an *Essay on the Culture, Properties, and Comparative Strength of Hemp, Sunn, and various other vegetable Fibres,* (entered on the Public Consultations, the 12th of February, 1801), in speaking of some samples of Sunn *(Crotolaria juncea),* that were sent him from Bombay by Dr. William Hunter, says:

"I am induced to think, that little or no maceration is employed in taking the bark from the stalks, or in cleaning the fibre, which may add to its strength; for certainly maceration, particularly if long continued, must weaken fresh vegetable fibres considerably."

HEMP,

DRYING AFTER WATERING.

When the Hemp is sufficiently rotted, it is taken out of the water and *dried*, to effect which, there have been various contrivances.

Chambers's Dictionary.

The grassing requires about five weeks; and if there are showers, it must be turned thrice a week; if not, twice will do. This is always performed on grass-land or layers. It is done by women: the expence is ten shillings per acre. It is then tied up in large bundles of eight or ten baits, and carted home to a barn or house to be braked directly.

Suffolk Report.

After watering, the Hemp is taken out and carried to a field of aftermath, or any other grass that is clean and free from cattle. The bundles being untied, it is spread out thin, stalk by stalk. In this state it must be turned every other day, especially in moist weather, lest the worms should injure it. It remains thus for six weeks or more, when it is gathered together, tied in large bundles, and kept dry in a house till December or January. It might do as well stacked, if kept perfectly dry.

Rev. Mr. Mills, in Suffolk Report.

When the Hemp is retted enough, they load it on slades, and carry it for grassing to an eaten eddish, which it improves much, great grass

grass succeeding it: nor does it taint the grass, so as to make cattle refuse it. After a shower it is turned, and left for three weeks, when it is turned again. If the femble quit the *bun* easily, it is ready to *lift*: it is then to be tied in bundles, and taken to a barn, taking great care to see that it is quite dry.

At Haxey.—After watering, spread it for three weeks or a month on stubbles, till the *bast* clears easily from the *bun*. Turn it once or twice; and when dry, bind it in beats, and carry it home and stack it.

After the Hemp left for seed has been watered, do not spread it, but set it up in little stooks to dry; then stack it to be ready to break and dress in the spring. It is not so good, but it sells as well as the other. This is yellow Hemp, that makes sacking and sail-cloth; the other is applied to linen.

Lincoln Report.

After watering, the Hemp is set up again on its root-ends against the wall, and there spread out and turned towards the sun until it is *dry*. When it is perfectly dried, it is housed, either in barns, or in such situations as that it may be exposed, as much as possible, to a wind: but it must be preserved from the least degree of dampness, either from without or within; for whatever becomes wet or damp, will be found to rot, and to infect and injure all around it, and the more so the longer it remains undiscovered.

Some rain is desirable during the time it remains spread out for drying, especially if it falls at intervals, and is succeeded by warm sun-shine: and even much rain, though rather unfavorable, is preferable to much dry weather; because the degree of putrefaction necessary for completing the disjunction of the harle from the outside or rind of the stalk, thereby meant to be effectuated, will be perfected

in a shorter space of wet than of dry weather; and that, while no prejudice arises from its being left standing without doors, a few days well improved, will be found sufficient for rendering it houseable, and also for bringing it in.

Durno.

Every one knows the method of *drying* the Hemp when it is sufficiently watered, and of what consequence it is to preserve it in a dry state, until it be thought proper to peel or brake it.

To dry the Hemp as much as it ought to be before it be braked, we may make use of either the public or private ovens; and those who take this method, know very well, with what precaution it ought to be done. Others dry it along a wall, at a distance from their houses, or in caverns made for the purpose, open to the south and sheltered from the north wind, under a rock, or only covered with dry stones, or pieces of wood with earth upon them, according to the custom or convenience of the place.

Marcandier.

When the Hemp, after having been properly steeped, is taken out of the water, the bundles should be untied and spread upon sand, or upon strong rocky ground; or if neither of these be at hand, it may be laid upon a field that has been lately reaped, and where the stubble still remains standing. This stubble will keep it hollow, and it will *dry* the sooner. Some *dry* their Hemp by spreading it out and setting it upright against a sunny wall, or by laying it along the side of a ditch. Grass is not fit for laying it on, because there will arise from thence a moisture which will rot the Hemp: for this reason it is, that the place where Hemp is spread to *dry* should be as free as possible from every kind of damp. When the Hemp is thoroughly *dry*, it is bundled up again and carried home, where it should be kept in a very dry place, till it is wanted for peeling or breaking.

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When but a small quantity of Hemp is to be *dried*, an oven is doubtless the safest method; and when the Hemp is dressed at home, it may perhaps be dried as fast by this means, as the other avocations of the family will admit of its being wanted. The only attention requisite in this case is, that the oven be not so hot as to endanger the fine and tender fibres of the Hemp; for too great a heat may not only scorch them, but likewise so parch the oil in the Hemp, as that the Hemp will afterwards remain harsh and dry, and not be so easily whitened as it might otherwise be.

Where the quantity of Hemp is greater than can be managed with an oven, it is dried on a kiln; and this is a good method, provided the fire here be also very moderate, and made of such materials as do not blaze or sparkle, because of the great aptness of dry Hemp easily to take fire. Coke is, perhaps, the very best fuel that can be used for this purpose.

Mills's Husbandry.

The Hemp having been properly watered and cleansed, set it upon the dry earth upright, that the water may drain from it: which done, rear it up either against hedges, pales, walls, backsides of houses, or such-like, where it may have the full strength or reflection of the sun, and being thoroughly dried then house it.

England's Improvement.

Abroad, I am told, they have a kind of oven built on purpose for drying Hemp: but here the planters content themselves with erecting a kind of scaffold, covered with hurdles, over which they spread their watered Hemp to a moderate thinness, and then kindling a slow turf or peat fire underneath, they keep turning the Hemp till it is sufficiently dry; after which they preserve it by stacking till it is thrashed.

Complete English Farmer.

When the Hemp is taken out of the water, the bundles of it should be untied, and set upright against a sunny wall, or on the bank of a ditch, or it may be spread out in any dry part of a field. Care must be taken to turn it from time to time; and when the Hemp is thoroughly *dry*, it is bundled up again, and carried home, where it should be kept in a very dry place, till is is wanted for peeling or breaking.

The Hemp that is to be broken should first be rendered very *dry*. For this purpose, the Hemp-growers usually have a *drying-place* at some distance from their houses; for nothing can be more dangerous than to dry the Hemp in the chimneys of the houses, as is done by the peasants in some places. Some put their Hemp into their ovens to dry; and in that case there is no danger of burning the house: but the Hemp frequently takes fire, nor is it possible to dry a large quantity in this manner. The drying-place is a kind of cavern, which is generally six or seven feet high, five or six feet wide, and nine or ten feet long. A hollow under a rock is often made use of for this purpose; but as that cannot always be met with, it is frequently necessary to have recourse to art. In this case, some form the top of the drying-place with stones, others only close it with pieces of wood, over which they lay a quantity of earth. But whichever of these methods is taken, the drying-places should be so situated as to be sheltered from the north and north-east winds, and open to the south, that it may receive the benefit of the sun; because the usual season for breaking of Hemp is in clear frosty weather, when the business of the field is suspended.

At about four feet above the floor of this drying-place, and two feet from its mouth or entrance, three bars of wood, about an inch thick, are placed across the cavern, from side to side, and there fixed. On these bars is laid, about six inches thick, the Hemp that is to be dried.

A careful

A careful person, which generally is a woman, then keeps constantly burning, under the Hemp so laid, a small fire, made of fragments of the reeds of Hemp that has already been braked or peeled. The person thus employed must be extremely watchful, as this kind of fuel is soon consumed, and must, of course, be frequently replenished, in order to keep a constant and regular fire all over the hearth, which is absolutely necessary. Very great care must likewise be taken, that the flame do not ever rise so high as to set fire to the Hemp, which is exceedingly inflammable, especially after it has been drying some time.

The same person also takes care to turn the Hemp from time to time, in order that it may be dried equally in all its parts; and likewise to put on fresh Hemp, when the former is dry enough to be taken away and sent to the braker.

Du Hamel.

When properly watered, it must be taken out, and laid upon its side until it be drained and turn stiff, so as to stand upon its root-ends spread, leaning to walls, ropes tied between trees, or poles put into the ground; because, if it were spread upon the ground, a certain worm is known to breed amongst it, which would destroy it in a short time. When the Hemp is thoroughly *dried*, it is to be bound up in bunches and carried to the dressing.

M'Donald's Essay.

When the Hemp is sufficiently steeped, the bundles must be taken out one by one, and washed, to separate the filth and loose particles. It should then be set on the root-ends to drain, the bands be untied, and the Hemp placed against a fence, exposed to the sun and air, that it may be thoroughly dried.

Taylor's Instructions.

BENGAL.

HEMP.—*Cannabis sativa.*

The stalks of the Hemp, after being sufficiently watered, must be taken out and spread on the grass *to dry*, during which they must be frequently turned.

Mr. Douglas, 5th May, 1801.

SUNN.

At BAZETPORE, in the District of Dacca, after the fibrous parts are well separated from the roots and well washed, the plants are laid in *the sun to dry* before stripping them.

JUNGYPORE.—After it has been washed and beaten in the water, it is laid in the *sun an hour or two*; and when half *dried*, the stalks are separated.

PATNA.—After the cuttings are sufficiently cleared from the mud and exterior bark, they, with the interior bark on them, are put in the *sun to dry*.

Board of Trade Cons. 14th Jan. 1793.

After watering, the plants forty hours, they should be taken out and *dried gently* in the sun for *three or four hours*, before the fibres are separated.

Mr. Fleming.

After watering, the plants should be taken out and *dried*.

Mr. Douglas.—Board of Trade Cons. 5th May, 1801.

GOLLAGORE.—As it appears, that, after steeping and *drying*, the fibre sustains no injury from being left on the stem; the Resident proposes to erect buildings on the banks of the River, to contract for the plants being delivered

delivered after being steeped and *dried*, and that the process of stripping from the stem and dressing be performed by the Convicts, under the superintendance of the Europeans that are coming from Europe.

The Board do not approve of employing Convicts.

Board of Trade Cons. 25th Sept. 1801.

This also is one of the points on which Mr. Frushard combats the propriety of Mr. Fleming's Instructions.

Mr. Fleming, he observes, lays down *three or four hours* only for the time of *drying* when out of the basons, and to be dried gently in the sun; but in France, in Holland, in Switzerland, and in Russia, the plant is most *thoroughly dried* before it is put under the brakers, indeed so thoroughly, that recourse is almost invariably had to fire-kilns and ovens.* But this excessive drying is merely to get rid of the reedy part with the greater facility; and I am persuaded it must be rather prejudicial to the strength of the fibre, since Mr. Du Hamel says, that Hemp exposed to the excessive heat of the weather for any length of time will make it perish†.

The Method of *Drying* in Russia, as given by the French Ambassador at that Court, is a scuriously complicated as their Mode of Steeping. They tie up the plants in bundles, about the size of a man's thigh at the knee. These bundles are placed upright, supported by a stake

* It appears, that, at Soonamooky, the hand-brake failed altogether. The Sunn was so brittle after the drying, that the fibre broke with the boon in the teeth; and by afterwards damping the Sunn the boon would not separate from the fibre in the heckle. Beetling with a smooth mallet was not more successful.

† This is an undoubted fact. The sun will have an effect on the Hemp even in the act of spinning. This led to the forming of spinning-walks under the shade of trees; and of late years under covered walks, where the parties have been enabled to encounter the expence.

stake in the centre, and then are left one day to drain. The next day they are spread abroad to *dry*; after which they are made up in heaps, and covered over with straw or hawlin of any kind to make them *sweat*; and when they have *sweated* enough, they are laid again in small heaps, so that the air may dry them in the shade by blowing through them; after which they are most effectually dried by fire, kiln, or oven, and immediately put under the brakers whilst yet hot: and be it observed, that the Livonians say, it is in this operation of *sweating* that the good or bad quality of their Hemp depends.

This then, it should seem, is the great arcanum we are seeking for; at all events, this is a point for us to ascertain and verify by experiment. It makes, says Mr. Frushard, a strong impression on my mind as something like the truth. We all know how essential this *sweating* is to the well curing of every thing green that we preserve, whether it is herb, fruit, or grain. They do not appear to know the full force or management of this in India, though they are not entirely ignorant of it. The reason why their tobacco falls so much to dust, is owing to its not being *sweated* enough. When properly *sweated* as they manage it in America, it becomes tough like a bladder; and toughness and suppleness are the qualities wanted in Hemp. It does not appear from the French Authors, that they avail themselves of this information, or perhaps their writers with-hold it as a secret, though it may be practised and promulgated among themselves. Savary, though he says but little on Hemp, mentions *sweating* as necessary; and on trial it may perhaps be found, that the Livonians are not only ingenious but ingenuous in declaring the quality to depend on this operation being well or ill performed.

Now the method practised by the Natives of this country, beats both the French and Russian for facility and expedition. They divest

the

the reed from its fibre immediately from steeping without drying, by which they avoid the kiln and the oven*; which upon every principle of sound reasoning, deduced from all that has been laid down by the Societies, has obtained more, not to say solely, for the more readily getting rid of the reed, than for the benefit of the fibre, to which it should seem even prejudicial. The celerity with which the Natives get through this business is highly in favour of the strength of the fibre and of their mode of practice; and should *sweating* be found to answer, it will be found much more congenial to its execution than the doing it while the fibre be yet on the reed.

The Natives say, that to *dry* the plant on taking it out of the water, before separating the fibre from the reed, will occasion a much greater loss in tow; so that they never practice this method but when distressed for time, and under the dread of leaving it too long in the water, when any parcel proves too many for the labourers employed in one day.

Board of Trade Cons. 2d September, 1801.

RUNGPORE.—The Natives are at a loss how the fibre is to be separated from the stem of the plant, if it is to be thoroughly dried after taking out of the water, and before the peeling commences. They observe, it will cause great trouble in picking out the pieces of the rind, and will break the fibre into small threads.

Board of Trade Cons. 25th September, 1801.

DACCA.—To obviate the objections of the Natives, the Resident proposed, that if they would *steep* the plant according to Mr. Fleming's directions, the *drying it after steeping* should be dispensed with. This

 was

* From the heat of the climate I should suppose they do not need either. R. W.

was partially acceded to, and some has been prepared accordingly; but it appeared to be much inferior to the Sunn prepared in the Country mode.

Board of Trade Cons. 13th July, 1802.

HEMP;

THE MODES OF SEPARATING THE FIBRES FROM THE STEMS.

AFTER the Hemp is sufficiently dried, they proceed either to *peel* it by taking one stalk after another, breaking the reed, and slipping off the bark, or to *break* or *brake* it. The operation of breaking Hemp, or beating out the dry *bun* or *hex*, which is the woody part of the stem, from the rind or bark which covers it, is performed three ways: by beating the Hemp with beetles, which is laborious and tedious; or by a toothed-instrument called a *brake*, beginning with the root-end; or, which is the best method, by fluted rollers, that are wrought by horses, wind, or water. The Moravian Hemp-mill, used in America, is a good instrument for this operation. It consists of a large heavy stone, shaped like a sugar-loaf, with the small end cut off. This is moved by a water-mill; and the Hemp being laid on the floor, is bruised by the weight of the stone passing over it. Mr. Robert Macpherson, Assistant Secretary

to

to the Commissioners and Trustees for Improvements in Scotland, has lately invented a new water-mill and foot-machines, for Breaking, Scutching, and Beating Flax and Hemp.

Chambers's Dictionary.

After the Hemp is thoroughly steeped, the next operation is to separate the bark from the reed or woody part: and this may be done in two ways; either by pulling out the reed from every stalk with the hand, or drying and braking it like Flax.

Hemp is broken by machinery, after being steeped in a manner similar to Flax: but the instruments used for this purpose are all worked by the hand.

Encyclopædia Britannica.

In the provinces that abound with Hemp, and where the people are laborious, they generally brake it all. For this end it must be made exceedingly dry, that the stems, once put into the brake, may not come out till they are perfectly broken, and as it were ground to pieces. The fibres of the Hemp, rubbed and bruised by this first operation, are cleared of the grossest gum, divided, and rendered fine and soft; and when this work is well performed, as we have seen it done*, the Hemp is separated from the stem without any kind of loss, and the advantages which the manufacturers derive from it are very considerable.

We shall give no description of the instrument called the brake, which is as well known to such as make no use of it as to those that do; and

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* In several cantons of Lower Berry, Argies, Busançois, Azay, Martezai, &c.

and in case of need, may be easily brought from the places where it is used. It consists only of two pieces of wood, may be had at a very moderate price; and a workman who has seen but one model of it, will be able to make as many as may serve a whole province.

One need see Hemp braked but once, to be immediately master of the whole art. The man or woman who brakes (for in many places it is the work of women), takes in the left hand a handful of Hemp, and in the other the upper jaw of the brake. The Hemp is put between the two jaws, and by raising and letting fall several times with all his force the jaw he has in his right hand, it breaks the dry stems under the bark that lies round them. By moving the Hemp in this manner between the two jaws, the stems, ground to pieces, and as it were reduced to dust, are forced to quit the Hemp. The grossest part of the gum falls down like a kind of bran, and the finest flies away like dust. When the half of the handful is thus broken, he puts under the brake that part which he held in his hand, and never leaves it till the whole handful be perfectly broken. It is then stretched upon a table, or on the ground; and when he has about two pounds weight, he makes it into a parcel, which he doubles, at the same time twisting it slightly; and this is what is called a Head of Hemp or undressed stuff. In this manner all the lower ends of the Hemp are as well divided as the tops, and the manufacturer loses not so much in hards as he would otherwise do. All the fibres in the hand of the person that holds the parcel by the middle, retain as far as possible their natural length; and this first preparation qualifies the Hemp much better for the other operations of the heckle than that of peeling. A woman may brake from twenty to thirty pounds of Hemp in a day; and this is a very great advantage to those that cultivate this plant.

We

We are far from condemning the method of braking Hemp, when it is done with all the care that is necessary. It is, in many cases, preferable to Peeling, the inconveniences and abuses of which will be explained under the Head of PEELING.

Marchandier.

The operation of braking Hemp, by which general term is however strictly meant only the breaking of the reed, which some call the bunn, or woody part of the stem within the bark; for the bark itself, of which is made the filamentous substance that is spun and used in manufactures, only bends under the hand of the dresser, and does not break; this operation, I say, has hitherto generally been executed three ways, namely, by beating the Hemp with beetles, which is a laborious and tedious work; or by the Dutch hand-brake, which is in every respect much preferable to the beetle; or by fluted rollers, worked by horses, wind, or water; but of choice by the latter, where a running stream can be procured.

This last is more expeditious and less laborious than either of the other ways: but it is dangerous to the workmen employed therein; because, if by any inadvertence the rollers should catch hold of their fingers, the loss of a limb, at least, is inevitable. The only means of preventing this dreadful consequence, in such a case, is to have an iron crow at hand, ready to clap instantly between the rollers, as is practised in sugar-works, which are of a similar construction.

The fluted rollers are undoubtedly the best instrument for breaking Hemp, because the length of the stalk, and the strength of the reed of this plant, must render the Dutch brake a very tedious operation, especially when large quantities of Hemp are raised, as must be the case, wherever a sufficiency of it is cultivated to answer the purposes of the

great and important manufactures in which it is employed in this nation.

The Moravian Hemp-mill, used in America, is also a good instrument. It consists of a large heavy stone, shaped like a sugar-loaf, with the small end cut off. A body of that form will go round in a circle if it be moved on a plane. This is moved by a water-mill, and the Hemp being laid on the floor in its way, is bruised by the weight of the stone passing over it.

Mills's Husbandry.

When the Hemp is dried and housed, it may be braked at leisure. This is done on a brake of wood, whose preparation is so ordinary that every one almost knows it: then brake and beat out the dry bun of the Hemp from the rind, which covers it. This ought to be done in dry and fair weather. Let your Hemp be spread out thin in the sun, in order to render it as dry as tinder, before it comes to the brake; for if either in the lying close together it shall give again or sweat, or through the moistness of the air or place where it lies it imbibes any damp, you must necessarily have it dried again, or else it will never break well, nor the bun fall from the rind, as it should: but if the weather be not seasonable, and you have occasion to use your Hemp, you should then spread it on a kiln, and making a soft fire under it, dry it upon the same. But because this is oftentimes dangerous, and much hurt hath been received thereby through casualty of fire, I advise the sticking four stakes into the earth, at least five feet above the ground, and laying over them small overliers of wood and open flakes or hurdles: upon the same spread the Hemp, and also rear some about it, but leave one open side; then with straw, small shavings, or other light dry wood, make a soft fire under it, and so dry it and break it. This will be done without any danger: and as you brake it, open your Hemp which you hold by handfuls,

handfuls, and look into it, beginning always to break the root-ends first: and when you see the bun is sufficiently crushed, fallen away, or at most hangeth by very small shivers within the Hemp, then it is braked enough; and then that which before was called a bait or bundle is now called a strike. Lay them together, and so house them.

The drying is best done in a large great oven, because it is most discoloured by the smoke.

That the Hemp may be braked with the more facility, two distinct brakes are used: one must be an open and wide-toothed or nicked brake, and the other a close straight-toothed brake; the first being to crush the bun, and the latter to beat it forth.

England's Improvement.

The brake resembles a bench, made of a plank five or six inches square, and seven or eight feet long. In this plank two large mortices are cut, extending its whole length, and a full inch in width. The three divisions, which were formed by the two large grooves or mortices, are sharpened on the edges.

Over this piece of wood another is fitted; one end of it being made fast by means of a hinge, and the other shaped into a handle. It has two longitudinal sharp edges or swords, which enter into the corresponding grooves of the under part of the machine.

The person who performs the operation of breaking, takes a large handful of Hemp in his left hand, and with the right lays hold of the handle of the upper jaw of the brake. He then places the Hemp between the two jaws of the machine, and by repeatedly lifting up and forcing down the upper-jaw, bruises the reed; and by pulling the Hemp between the two jaws, separates the bruised particles of the reed from the fibres. When one half of the handful of Hemp has been thus

thus sufficiently braked, the workman turns it, that the part he before held in his hand may undergo the same operation.

When he has obtained about two pounds of well-braked Hemp, he folds it in two, and twists the two ends slightly together: these parcels are called Heads of Rough Hemp.

Du Hamel.

Hemp being so very long, no lint-mill, hitherto invented, can dress it properly, without cutting it: no, nor the stock and hand, without much difficulty.

Therefore the method used for that purpose (in countries where it is raised to great extent, is by coarse and fine brakes, and peeling it from the boon with the hand. Those employed in peeling it are old men, women, and children.

M'Donald's Essay.

After the Hemp has been watered and well dried, it is fit for the brake. If it cannot be sufficiently dried in the open air, it may be done by drying it carefully upon sticks placed across, about four feet above a gentle fire. The Hemp may be laid thereon about six inches deep, and carefully turned from time to time, to be equally dried. In the Hemp countries, wind and water-mills, with particular machinery for the purpose, are contrived to break and prepare the Hemp in a more cheap and expeditious manner: but in a country where a manufacture is in its infancy, the most plain and simple methods must be adopted, and such machinery be used as the farmer can make himself. To break Hemp, the person employed takes in the left hand a handful of Hemp, and in the other the upper jaw of the brake. The Hemp is laid across, between

between the two jaws; and by raising and letting fall the upper jaw several times with great force, it breaks the dry stems under the rind that surrounds them. By this means, the gummy matter and pith are made to quit the Hemp, and the operation is continued till the whole handful be perfectly broken. The Hemp is then stretched out on the ground or a table; and when about two pound weight is thus prepared, it is made into a parcel, by doubling and twisting it slightly, and is then called a Head of Hemp or undressed stuff. A woman may break from twenty to thirty pounds of Hemp in this manner in one day.

Taylor's Instructions.

The mode of braking, cleaning, or dressing, as well as the form of the several instruments used for the purpose, being supposed to be the same in these as in other countries, and the difference to consist only in the degree to which the cleaning is carried; a particular description of this operation seems to be superfluous. It may not, however, be unnecessary to observe on this head, that, in case the steeping and subsequent drying is found not to have sufficiently answered its purposes, *viz.* that of softening the harle, and rotting the rind to such a degree, as that they may be separated, and the former cleared from the latter, without damaging the harle, recourse is had to a further drying in a room heated by an oven or stove; and that every peasant, in the practice of cultivating Hemp, fits up a small room, detached from his dwelling-house, for that particular purpose.

Durno.

Breaking is done by the stone at one shilling. There are many people in the district that do it, and earn fifteen or sixteen pence a day, and beer. The offal is called Hemp-sheaves, which makes good fuel, and sells at two-pence per stone.

Suffolk Report.

When the Hemp is retted, it is bound up in sheaves or large bunches; and, with a machine called a brake, the cambuck is broken in pieces, and with a swingle is cleared from the small remaining pieces of the cambuck, and then bound up in stones. In Suffolk fourteen pounds and a half of Hemp are deemed a stone. The Hemp which breaks off in the operation is called shorts: this is bound up by itself, and is about half the value of the Long Hemp.

The price of braking varies with the length, and the ease or difficulty with which the cambuck separates from it. From twelve to eighteen or twenty pence is paid: twelve and fourteen pence are the most common prices. The refuse is only fit for burning, and is sold at from one penny to two pence per sack.

I have been informed, there are mills erected for braking flax; and as the mode of braking is similar, I imagine they might be applied to Hemp. In some parts of the country, where much Hemp is grown, this might prove a considerable saving. But as Hemp is very bulky before it is broken, and small quantities only are grown in each village, in general, I fear, it would not answer the expence to erect many of them.

When the Hemp is broken, it is fit for market, and is purchased by the hecklers. Diss, Harleston, and Halesworth, are considerable markets for Hemp; but the greatest quantity is sold to the neighbouring hecklers, without being carried to maket.

A Stowmarket Manufacturer, in Suffolk Report.

The stalks are broken, and the bark wholly freed from them, by an instrument called a braker. The art of braking it would be learned by a labourer of common capacity in a few hours; and the swingling of it, which follows, requiring some slight as well as labour, though

though more difficult, might in a little longer time be acquired. After braking and swingling, it is tied up in stones, and it is sent to the heckler. —In the state Hemp comes from the brake, it will fetch from six shillings and sixpence to seven shillings and sixpence per stone. In 1787, it sold as high as nine shillings. The expence of braking is from one shilling to one shilling and sixpence per stone.

Rev. Mr. Mills, in Suffolk Report.

PEELING.

The method of *peeling* Hemp, is so simple, that a description of it would be needless. Even children, and the aged and infirm, may perform it with ease, by only taking one stalk after another, breaking the reed, and slipping off the bark. This may, likewise, become the work of every person belonging to the farm in winter evenings, and at such times as the weather will not admit of their working without doors. It must, however, be allowed, that there are some inconveniences attending this method. The peeled Hemp comes off in ribbands, which does not answer in the heckling, so well as that which has been broken. More of the useless membranes, especially towards the root, still adhere to it, and, by increasing its weight, render it (to use the common saying on this occasion), better for the seller than for the buyer: besides which, the Hemp does not always peel off in equal lengths; and from thence arise considerable disadvantages and loss in its future dressings.

Mills's Husbandry.

Those who have time and patience enough for peeling * the Hemp

* We are of opinion, that one ought only to peel the large stalks of Hemp, which could not be braked without too much difficulty and trouble.

Hemp, are obliged to take one stalk after another, to break the stem, and draw off the Hemp, by letting it run between their fingers: this method is so plain and so easy, that children can perform it with as much success as grown persons; the aged and the infirm apply to it with equal ease. Generally, the evenings, or those times wherein nothing else can be done, if such time there be, are thus employed. This business is particularly suited to those who watch the cattle; but we are of opinion, that the strong and laborious, who can be at no loss for more useful and profitable employments, ought not to amuse themselves with it.

Besides loss of time and the expence that must be sustained by those who give their Hemp to be peeled, this practice is also attended with a great many inconveniences to the buyer and to the manufacturer. The Hemp that is peeled generally retains some thick parts at the end next the root, the weight of which is profitable to the seller, but contrary to the interest of the buyer. The gum and dirt it has contracted in the thick and standing pools where it was watered, sticks constantly to it, and raises an unwholesome dust in the shop where it is dressed, which is greatly injurious to the health of the manufacturer, as well as to his pocket.

Moreover, the peeled Hemp does not always retain its whole length: one is obliged to break the stem several times to get off the bark; thus the short Hemp is mixed with the long, and this in equality is no less prejudicial: the broken fibres that are mixt up with the rest of the parcel, only produce hards, which are of no great service. After all, both these methods may have their advantages and disadvantages their conveniences and inconveniences; and men of sense, who mind œconomy, may choose that which to them appears the best, according to times, places, and other circumstances.

Marcandier.

In

In some provinces of France, they peel all their Hemp: in other parts, those only peel it who grow small quantities.

The mode of peeling the Hemp is so simple, that even children may perform it with ease, by only taking one stalk after another, breaking the reed, and slipping off the bark.

This work may perhaps be deemed very tedious: but as it is performed at such times when there is no other employment for the persons belonging to a farm, or by the children who tend the cattle, it is not very costly to a farmer who has a large family. But it would cause a considerable waste of time to small families, who will find it more advantageous to break their Hemp.

Du Hamel.

HEMP,

MODE OF SEPARATING THE FIBRE FROM THE REED, AS RECOMMENDED BY THE ABBÉ BRULLES.

WHEN you find any quantity sufficiently soaked, take it with care, putting your hands under it to prevent breakage, and transport it to a *trough* or *table;* for there are two methods of working it. If you work it in a trough, you must be provided with one somewhat longer than any Hemp that you mean to work in it, twelve or fourteen inches deep, and of what width you think proper, according to the number of persons you employ at it, as one, two, or four. To this trough must be fitted two pieces of plank, of about a foot in length, but of such width as to stretch over a bundle of the Hemp as it lies *opened* in the water. These planks must be set on one side with teeth of brass wire; and when the Hemp is ready for drawing, it must be laid on it as it lies on the water, to keep it straight and immerged.

If you work the Hemp on a table, you must, before taking it out of the water, open a little the bundles, and rub the stems between your hands, to get off what you can of the slime, and to loosen the rind. You must likewise push the bundle along in the water, with the root-end foremost, to loosen the rind at that end where the operation is to be begun. If you do not thus rub and scour your Hemp in the water, where you soak it, you must do it in the trough; but in either case you must be careful to keep an even and steady hand, to avoid breaking the reed, which as many times as it happens renders the operation of getting the

the reeds out tedious. If it is wrought on a table, the bundle must be frequently but slightly wetted. If any suitable method could be taken, to make water drip gently on it, it would be best. A plank must be laid on the bundle to keep it steady.

All matters being properly disposed upon the table, or in the trough, you must begin at the root end to push back a little the rind from the stem: then taking hold of one stem at a time, and rather near the outside than the middle of the bundle, keep your hand and the reed under water (if you work in a trough), and draw it out from the bundle, as straight as possible: you will find it come out clean as a sword from its scabbard. As you proceed, you may take two, afterwards four, and up to six or more reeds at a time, which will draw out still more easily. When you have drawn out all the reeds that you can find at the root-end, lift up the spiked plank which was at the upper end, leaving on that which was in the middle, and draw out such pieces of reed as you may find at the upper end, and which have remained after drawing out what you could at the root-end, because they were broken: lastly, take off the plank which was laid on the middle, and take out all the relicks of reed you can perceive. If your Hemp was in good condition for drawing, you will now find all your reeds perfectly clean on the floor, and the rind, which is the Hemp, lying in straight threads in the water or on the table.

You will perceive, that among the Hemp there is a great quantity of gum left, looking like a jelly: this you will wash out, as if you were washing any long straight piece of cloth, observing not to displace or twist the threads, which would thwart the future operation of dressing or heckling. The finer and whiter you desire your Hemp to be, the more waters you will run it through, squeezing it out at each time of washing; but I think it always right at the last, to run it through a water,

water, in which a slight quantity of soft soap has been beat up, after the rate of an ounce of soap to three pounds of the Hemp, when dry. Do not squeeze it out from this soap-water, but hang it to drain; and when a little stiffened, open a little the bundle, and lay it to dry on a grass-plot or floor, the former is preferable. This soap-water is not absolutely necessary, but is certainly of great use for softening the Hemp, and rendering it pleasant and easy to dress: but it may be dispensed with, where it is very inconvenient, and where the Hemp is intended for coarse purposes. It is obvious, that all these operations would be carried on to the most advantage near to some running stream, or large lake, if t be a standing water, on account of the great use that is made of that element, and to save a great deal of the trouble of transportation.

When thus dried, the Hemp is proper either for dressing or storing: if the latter is intended, particular care must be taken that it be thoroughly dry; it will otherwise heat and spoil. As the Hemp, peculiarly intended to be hitherto spoken of, is the male or flower-bearing Hemp, which is intended for fine uses, it is to be observed, that it must be worked with heckles or hatchels such as are used for flax-dressing, by which it may be brought to an extreme fineness; and the shorts having no pieces of straw or reed amongst them, may be carded and spun, and brought into use for all the same purposes as cotton, and the same methods used for bleaching and softening. It is likewise requisite to work this Hemp as soon as pulled, without which the greatest softness and whiteness cannot be obtained: and as this sort generally falls ripe between hay-time and harvest, when the weather is warm and fine, and the women most at liberty, it will be a suitable occasion to draw and cleanse the Hemp; the dressing may be reserved for winter.

HEMP.

MR. MARCANDIER'S HINT FOR A SECOND WATERING.

Mr. Marcandier, (after remarking, that the fibres of Hemp have as much occasion to be washed and purified from their gum, to make good thread and fine cloth, as the finest wool to be cleaned and purged of the sweat that cleaves to it, in order to be spun, and undergo the necessary preparations to its being made into fine stuffs) adds, "After having long considered the various means that might be found to relieve those who work upon Hemp, and observed in the Hemp itself those admirable qualities, of which, hitherto, no improvement has been made; we found that the common watering of Hemp was nothing but the dissolution of a tenacious gum, natural to the plant, the parts whereof are joined together merely by means of it; and that, in order to this first preparation, it was sufficient to leave the Hemp in the water, in proportion to the quantity and tenacity of this gum. That, after having prepared it only for being peeled or braked, it seemed very proper to give it a second watering, to soften the bark, that still remains hard, elastic, and incapable of being brought to a proper degree of fineness. Accordingly, by the different experiments we made, in the presence and under the direction of Monsieur Dodart, Intendant of Berry, we have found means easily and without expence to give it those qualities that are natural to it, and the uses whereof were not hitherto known.

The water that has already had power to separate the bark from the stem, serves also to divide, without trouble or hazard, the fibres from

one another, by a total dissolution of the gum that remains in them. For this purpose, the Hemp intended to be put into the water is divided into small parcels: these are taken by the middle and laid double, twisting them slightly, or tying them softly with a piece of strong packthread, that so they may be stirred and managed easily without mixing. After they have all imbibed the water, they must be put in a vessel of wood or stone, in the same manner as thread are stowed in a ley-tub. The vessel is then filled with water, in which the Hemp is left for some days to moisten, as far as is necessary for dissolving the gum. Three or four days are sufficient for this operation; and if one has leisure to press every parcel of Hemp, to stir it, and work it often in the water, which it would be necessary also to renew, this dissolution might be attained more expeditiously, and twenty-four or thirty hours would, in that case, be sufficient for the operation.

When you see that the Hemp is sufficiently penetrated by the water, and cleared from the coarsest part of its gum, it must be taken out by single parcels, wrung, and washed in some river, to purge it, as much as possible, from the muddy and gummy water that remains in it. After it is thus cleared, it must be beat upon a board, to divide farther the parts that may still remain too gross; then you stretch out, upon an upright piece of strong solid wood, every single parcel of wet Hemp, after having loosed the packthread.* Then you strike it lengthways with the edge of the instrument that laundresses use for their linen, till the thick parts at the ends are sufficiently divided. The parcels must not be beat too much; for the fibres, by that means, being too much separated

* We have found by experience, that it was more convenient not to use packthread in this case, provided care be taken to twist the Hemp, so that the fibres may not be mixed or disordered.

rated and weakened, will not have strength enough to stand the operations of the heckle: and this is a caution, the necessity and consequences whereof can only be known by experience. There is even good ground to think, that by leaving the Hemp long enough in the water to obtain the division of the fibres by the dissolution of the gum only, we might dispense with the beating it altogether; but the different qualities of Hemp would require such particular attention, that it would not be advisable to take this method. The more quickly the operation is performed, the Hemp runs the less danger; for there is some reason to believe, that by lying too long in the water it might have its fibres entirely dissolved, and reduced to pure gum. This observation leads to a great many remarks upon cordage, hempen cloth, and paper, which it might be tedious to insert, particularly here.

After this easy labour, which after all is the longest that is necessary, every parcel, one after another, must be washed over again in running water, and then it will appear what success is to be expected from this method. All the fibres of the Hemp, thus beat, are divided in the water, washed, disengaged from one another, and seem to be as completely dressed, as if they had already passed through the heckle. The more rapid, clear, and beautiful the water is, the more are these fibres bleached and purified. When the Hemp appears clear enough, and totally purged from its dirt and nastiness, we take it out of the water, wring it, open it, and expose it to the air; then lay it on a pole in the sun to drip and dry.

We might also use, for a second watering, the common leys of ashes*, either by making those leys for the purpose, or taking advantage of those which are made frequently for linen-cloth. From the different

* Hemp of a green, grassy colour, may be brought, by the use of the ley, to its greatest perfection, and the labour of beating it may be almost entirely dispensed with; it becomes white without trouble or loss.

different experiments we have made, and the observations of many persons, who with the same assiduity have applied themselves to this matter, we have discovered that the gum of Hemp, which has been pretty well cleared before, is by no means unfriendly to linen-cloth when it is mixed with it; and that it will be sufficient, in such a case, to put only a layer of clean straw, about two inches thick, in the bottom of the ley-tub, in order to filtrate and purify the water, and to attract all the mud and gum that is in it. By this easy precaution, the salts of the ley, thus set at liberty, exert their whole activity upon the Hemp or linen, which is penetrated by the water; and it has never been observed, that it left any spot or blemish. It will be easily imagined, that the warmth of the water, and the alkali of the ashes, must bring about a dissolution much more expeditiously than can be effected by cold water: but it will be no less necessary to beat the Hemp that may still remain not sufficiently divided, and to wash it, at least for the last time, in clear running water, to purge it entirely from the ley-water and its gum.

BENGAL.

MODE OF SEPARATING THE FIBRES FROM THE STEM.

HEMP, *Cannabis sativa.*

This, Mr. Fleming says, is done by braking. When perfectly dried, the stems are taken up and bruised, either with a Europe brake, or with a mill, like that used by the Natives for bruising the sugar-cane, after which they are scutched and heckled: or the fibre may be separated from the stem by peeling, instead of bruising; and when the steeping has been carefully conducted, this mode answers as well as the other.

Bengal Cons. 5th May, 1801.

SUNN.

BENARES.—The Hemp (Sunn) being separated from the stalks, and well dried and cleaned, is fit for use.

HURRIAUL.—When the fibres become soft and separate, they must be well washed in clean water, and afterwards placed in the sun to dry. The Sunn is then fit for use.

HURRIPAUL.—On the fifth day of its being under water, it is well washed and cleaned; the next day dried in the sun; after which the bark is taken off, when it is again dried in the sun.

MALDA.—After the Hemp (Sunn) is well watered, and the bark taken off, it is put in the sun to dry, tied up, and is then fit for use.

RUNGPORE.—After the plants are sufficiently watered, the bark or rind is stript off, well washed, and beaten about in the water, and put in the sun to dry.

Board of Trade Cons. 24th August, 1792.

DACCA DISTRICT.

BAZETPORE.—The bark and fibrous parts being sufficiently loosened by watering, it is then laid in the sun to dry: after which the stalks of the plants are pulled out; and the Hemp (Sunn), which remains, having been again dried in the sun, is packed up in bundles.

TEETBADDY.—After the Hemp (Sunn) is well washed it is exposed to the sun; and after having been sufficiently dried, the stalks are separated from the Hemp, which remains.

MOMENSING.—After the Hemp (Sunn) has been well washed, the fibrous parts are separated from the stalks and dried in the sun.

CHAUNDPORE.—After the Hemp (Sunn) is separated from the stalks, it is dried in the sun and made up into bundles.

TIPPERAH.—After the operations of beating and washing the Hemp (Sunn)

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(Sunn) are done, it is collected and exposed to the sun, and on being perfectly dry is tied up into bundles.

SERAMPORE.—The Hemp (Sunn) is well washed and dried in the sun, shaken and cleared.

JUNGYPORE.—After it has been washed and beaten in the water, it is laid in the sun an hour or two; and when half dried, the Hemp (Sunn) is separated from the woody part of the plant by the hand, dried in the sun, and carried to market, or laid by for use, without any further preparation.

PATNA.—After the cuttings are sufficiently cleared from the mud and exterior bark, they, with the interior bark on them, are put into the sun to dry; and when dried, the stems or sticks are drawn away singly, with the hand, from within the interior bark, which then becomes Sunn, and is ready for use.

CHITTAGONG.—When watered, the bundles are taken out, and the bark pulled from the stick, one by one; and then it is properly washed and dryed in the sun, and *beat into Sunn.*

Board of Trade Cons. 14th Jan. 1793.

Mr. Fleming describes the mode of separating the fibres from the stem, as practised by the Natives, to be as follows:

The plants after being pulled up, are put into water. When the plants have been steeped three or four days, *the dresser, standing in the water, takes up a handful of the plant, and breaking it in the middle, strikes one end of it on the water, until the fibre separates from the stem. He then does the same with the other end.* After this he hangs it up on lines to dry. When dry it is combed, if intended for fishing-nets, or small-lines; but if for common use, they merely separate the fibres a little with their fingers, and make it up into bundles for market.

By

By this mode of putting the plants into water as soon as they are pulled, without previously drying them in the sun, and by letting them remain so long a time in the water, the strength of the fibre is much diminished: but the Natives use it to save trouble, as the fibres in this way separate easily from the stem, without requiring to be bruised or heckled.

Instead of this he proposes,

Instead of putting the plants in the water immediately after they are pulled up, first to dry them in the sun for two days; after which they should steep them, but not allow them to be in the water above forty hours. The plants then *should be taken out, and dried gently by exposing them three or four hours to the sun.* When dried, the fibres may be either taken from the stem by PEELING; or the stalk may be BRUISED, SCUTCHED, and HECKLED, in the same manner as is practised with Hemp. The Natives would probably prefer *peeling*, as this work could be done by their children.

After watering the plants, they should be bruised with a brake, and then scutched and heckled. Were a quantity of this article required, the most expeditious method would be with a mill, similar to what is used in some parts of Europe; for an account of which *vide Encyclopædia Britannica.* If particular care is taken with the plants, they may likewise be prepared by *peeling.* After they have been watered about the same length of time as for the above-mentioned process of braking, they should be taken out, dried and heckled.

Mr. Douglas.—Bengal Cons. 5th May, 1801.

In India, the use of the Hemp-brake is unknown. The fibre is there divided from the pith, by peeling each plant separately, as is also done in some cases in England. If those who peel the Hemp-plants, are instructed to remove the fibre with as much caution as possible, to prevent

prevent it from separating into too small bundles, * and afterwards to clear it of as much of the slime and bark as possible, by washing it again in water, (operations which would cost little in a country where labour is cheap); such Hemp is very likely to excel materially in strength every kind, in which the fibre is more dislodged from its natural station, either by the brake, or any other mode of dressing or cleansing.

Letter from the Lords of the Privy Council to the Court of Directors, 4th Feb. 1803.

COMMERCOLLY.—When the bundles are taken out of the water, the rind is *instantly* separated from the Sunn, which is done by beating on each bundle with a large bamboo. This loosens the rind; when it is finally separated with the hand, and beating it about in the water. The Sunn is then hung out on lines to dry; and when perfectly dried is cleaned, by picking, exposure to the air, and beating it on mats.

Board of Trade Cons. 12th June, 1801.

PATNA.—The principal difficulty to overcome, will be the new mode of preparation, as it is attended with additional labour; and it is the labour required, which has hitherto prevented the cultivation of Sunn from being extended. It is, therefore, an object of importance, to point out a mode the most likely to facilitate the separaing the fibre from the stem, so as to render it unnecessary to attain this object by steeping the plant so long in water as to diminish the strength of the fibres. The most effectual way of instructing the Natives, will be by example, by shewing them what is expected, and the means of obtaining it.

Board of Trade Cons. 23d June, 1801.

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* So in the Original. Quere, should it not be *Ribbands?*

LUCKYPORE.—Objection is made to the mode of PEELING, which, the Natives state, will enhance the expence. In some places, the bark is separated from the stalk by *beating* with a kind of mallet, after its being taken out of the water and dried. If this mode is elegible, it would be less expensive, and the people be more willing to receive the advances, than if required to *peel* it. If it does not answer, *peeling* might be done afterwards, where some little progress had been made: the difficulty will be in the outset.

Board of Trade Cons. 17*th July*, 1801.

SOONAMOOKY. — The difference in preparation are the *drying*, *the shorter period of steeping*, and the second drying and *peeling*, which differ from the mode in practice. The Natives urge, the time of steeping is too short to admit of the fibres separating easily, and will require compensation for the additional labour.

Board of Trade Cons. 17*th July*, 1801.

SANTIPORE.—The mode of preparation required does not differ materially from that in practice. If what is prescribed is not suitable or convenient, some easy mode may be contrived.

The Resident offers a hint of bruising the plants with rollers, as is done with the sugar-cane, and afterwards striking them upon sloping planks, in the manner they thrash the corn; or to lay them on planks, and beat them with a mallet. He thinks this would be an expeditious mode, and that what fragments remained therein might afterwards be picked out with the fingers.

The Sunn gets so entangled in peeling with the hand, that it is almost impossible to unravel it. Will have it tried again, but broke and beat in the water, until the pith is cleared, in the manner practised by the Natives.

Board of Trade Cons. 11*th September*, 1801.

Mr. Frushard, in his objection to Mr. Fleming's method of preparing Sunn, on the subject of PEELING, says:—Peeling is sometimes practised in France, from its giving employment to their women and children; but the Society disapprove of this method, because it is attended with the inconvenience of having the fibres come off in ribbands, which do not readily divide under the subsequent operations of scutching and heckling.

The braking of the reed with the brake (a most simple machine) has greatly the advantage of giving suppleness and fineness to the fibre, without endangering its strength.

The Natives have two modes of separating the fibre from the reed: the one is performed in the water, the other on the land. When it is done in the water, the fibre is full of the reed; but when on the land, there is scarce any to be seen.

Upon making an Experiment (see p. 161) he says:—The impracticability of *reeding* the plant after *forty hours steeping is again confirmed*; and the drying the plant, so contrary to the first authorities, is again proved to be worse than nugatory, creating delay when expedition is required. The fibre, when once it is separated from the reed, should be dried as quickly as possible; for if it is left wet in heaps, to be put to dry only when all the work is done, it is to the full as bad as if it had been left in the water. As fast as it arrives out of the people's hands, it must be spread out to dry, either on lines or bamboos, and that under cover on the event of rain.

The objections that were urged against the mode of preparation laid down by Mr. Fleming, as stated in the several Residents' Letters, having been communicated to that gentleman; he informed the Board of Trade,

Trade, that, in regard to *separating the fibres from the stem*, he inclined to the mode of Beating, as stated by the Residents of Commercolly and Luckypore, and was of opinion,. the Natives might be allowed to follow their own mode: and that a latitude should be given to the Residents at all the Residencies, to permit the Natives to separate the fibre in any way they, in their discretion, should think right.

HURRIPAUL.—The Riotts renewed their objections to preparing it in the mode prescribed in separating the bark from the stalk. The Resident tried some of the earliest cutting in this way, and in separating the fibre from the stem, in the way practised by the Natives.

Board of Trade Cons. 25th September.

RUNGPORE.—The Natives are at a loss to know, how the fibre is to be separated from the stem, if the plant is thoroughly dried after taking out of the water, and before the peeling commences. They observe, it will cause great trouble in picking out the pieces of the rind, and will break the fibre into small threads.

Board of Trade Cons. 25th September, 1801.

MR. FRUSHARD.—It is recommended to us to *dry the fibre on the reed*, or rather *with the reed*, when taken out of the water. This is very practicable, but is practised by the Natives only when they are distressed for time to perform the operation in the water. They do this always reluctantly, knowing that the Sunn thus made runs into tow, when it comes to be worked; a fact he verified by trial and laid before the Board, finding it as near as may be two for one. The Sunn thus made hath the disadvantage of being more elastic, from not being so well cleansed from the gummy matter, as when reeded in the water, the fibre in that case being well washed and wrung after being separated from the reed, which, when dried on the reed, is of course omitted.

Board of Trade Cons. 4th December, 1801.

SOONAMOOKY.—As at first no latitude was given to depart from the instructions as to preparing it, no Riotts would venture to engage. They promised to make trial of it in small quantities, They were of opinion, that it would be impossible to separate the fibre from the stem after the first drying had taken place: but being at length convinced that their ideas on this head were erroneous, he entertained hopes that they would have prepared it properly;—when an inundation took place, and destroyed the plants. He fears the labour of peeling will be difficult to overcome.

REEDING, in the way recommended by the Abbé Brulles, answered tolerably well, and would have done better, had not the plant been stunted, woody, and bitten with the musketoes, which hardens the fibre to the boon, where they wound it; which was pretty general with all the plants, and attended with the necessity of longer steeping.

Reeding is liable to the same objection as Peeling,—the time it requires.

The HAND-BRAKE failed altogether. The Sunn was so brittle after the drying, that the fibre broke with the boon in the teeth; and by afterwards damping the Sunn, the boon would not separate from the fibre in the heckle. BEETLING with a smooth mallet was not more successful.

SANTIPORE.—The chaul, or outer bark, was removed by striking the bundle of plants on the water a few times after the steeping was completed; and this seems to be the only method by which it can be done.

Passing the plants through the churky, or rollers, as had been suggested in the Resident's Letter of the 18th July, was found to be of disservice, as it flattened the paccautie, or stems, and increased the difficulty of separating them from the fibres.

BEATING with mallets, as practised at Commercolly and Luckypore, was next tried. This appeared to cleanse the bundles of the plants from any remains of the bark or other dirt, and made the appearance of the Sunn whiter; but it also flattened the stems, and broke them into

pieces

pieces, so that the difficulty of detaching them from the fibres was much increased. The last, and apparently the best method, was that of placing bundles of the plants between two planks, and weights on the top, and drawing out the stems one by one, previously beating the bundles a little with a few rattans tied together; which part of the process was meant to produce the effect of the mallet, in part, by cleaning off any dirt that might remain, and loosening the fibres from the stems, without breaking them: and I believe it was in these respects useful. I found this method the most expeditious, and observed, that the fibres were less entangled than by any other. The stems in general came out without breaking, and such pieces as remained were few, and easily separated by the hand.

DACCA.—The bark is separated from the stem in the water, by *beating* the plant with a broad stick. It is then the Sunn is washed in water, and put in the sun to dry; after which it undergoes no other cleaning.

Board of Trade Cons. 13th July, 1802.

HEMP,

METHOD OF SCUTCHING IT.

SCUTCHING is an operation calculated to clear the Hemp from the small particles of the reed, leaves, weeds, dust, and the grossest parts of the broken or entangled fibres, which adhere thereto after Braking, called toppets or tow; as also to divide the longitudinal fibres, which by their adhesion form a kind of ribband.

In the place where the scutching is performed, the cieling should be lofty, and the windows large, that the dust occasioned by the operation may the more readily escape.*

The workman takes in his left hand a handful of Hemp, weighing about half a pound, and grasping it firmly, lays the middle of it upon the semicircular notch of the perpendicular board of the scutching-frame, and strikes with the edge of the scutch that part of the Hemp which hangs down on that board. After giving it several strokes, he shakes the handful of Hemp, replaces it on the notch of the perpendicular board, and continues to strike it, till it becomes sufficiently clean, and the fibres appear to be tolerably straight. He then turns the Hemp, and performs the same operation on the top-end as he had before done on the root-end; for it is usual always to scutch the root-end first. The workmen are too apt to slight the middle of the handful; but it should be equally well worked as the extremities. When a handful has been well scutched throughout its whole length, the workman lays

* M. Du Hamel has given minute instructions for forming the implements used in this operation, which I shall omit, and in lieu thereof introduce a plate, that will give the reader a more correct idea of them, than can be afforded by the most labored description. R. W.

lays it across the foot-board of the frame, and then takes another, to be prepared in the same manner. Lastly, when he has collected about thirty pounds of scutched Hemp, they are tied up in bundles, and carried to the hecklers.

It is necessary to remark, that if the Hemp were not well arranged in the hands of the scutchers, a great many of the fibres would be detached and rumpled; and for this reason, steady attentive workmen carefully arrange their Hemp before they begin to scutch it: yet, notwithstanding this precaution, many of the fibres fall to the ground during the operation. These are not, however, lost; for when a certain quantity is collected, they arrange it again in handfuls, and scutch it separately; so that there remains only the worst part of the tow, with which mattrasses were formerly stuffed; but having been found unfit even for that purpose, it is now used only for making flambeaus, mops, &c.

It requires more or less time to perform the operation of scutching, in proportion as the Hemp is more or less clean, and free from the boon. The quantity of waste occasioned by scutching, likewise depends upon the same circumstances. A good workman may scutch from sixty to eighty pounds of Hemp per day; and the waste may be estimated at about five, six, or seven pounds per quintal.*

A competent knowledge of scutching may be very quickly attained: nothing more is required than care to make as little waste as possible. With this qualification, any robust person, with a sufficiency of strength in his arms, will be fit for it: but strength is absolutely necessary. From an ill-judged parsimony, this work is sometimes entrusted to boys and other inefficient persons, who work for little wages. But this is bad policy; and will be avoided by such intelligent manufacturers as

* The usual allowance for waste on Russian Hemp, is four pounds per hundredweight. R. W.

as are convinced of the importance of this operation. Indeed every kind of Hemp ought to be scutched with the utmost attention: and, if it were not for causing too much waste, I should even recommend, when the Hemp is coarse and harsh, to beat it with mallets before scutching. The following are the advantages which I think are derived from scutching.

1. *The Scutch more effectually clears the Hemp of the boon, or particles of the reed, than any other operation we are acquainted with.*

It is of importance, that the Hemp should be well cleared of the boon; for wherever any particles of the reed happen to be in a thread, they either increase the bulk in such places, which is a defect; or they render the thread weaker, these particles being extraneous bodies, which do not contribute to the strength of the fibres. Besides, these reedy particles, sticking sometimes transversely, occasion small vacuities, which become filled with tar, and thus uselessly increase the weight of the cordage.

To be satisfied of the utility of scutching, we need only take a view of the floor of a scutching-shop, after that operation has taken place. But it may be said; and the objection, if founded on fact, would be just, that if the heckle alone can detach the whole of the boon, the operation of scutching might be considered as superfluous. We know the contrary of this by experience. Having ordered some Riga Hemp, which contained a good deal of the boon, or reedy particles, to be heckled by steady and experienced workmen, on fine-toothed heckles; the result of the experiment was, that the Hemp still remained full of the reedy particles: but having caused some of the same parcel of Hemp to be scutched before heckling, we succeeded in making it much cleaner; and we plainly observed, that the reiterated strokes of the scutch more effectually detached the reedy particles sticking to the Hemp,

Hemp, than the heckle, betwixt the teeth of which the boon passed with scarcely any resistance.

2. *The operation of Scutching renders the Hemp finer.*

We have already remarked, that the finer and softer Hemp is rendered, and the more its elasticity is diminished, the fitter it becomes for the manufacture of good ropes.

The reader may recollect, that, in speaking of Hemp in its rough state, or as it comes out of the hands of the peeler, we said, that it formed a kind of ribbands, which are very hard: these ribbands are composed of the longitudinal fibres, which are joined together by smaller and tenderer fibres, or by a sort of vesicular web. To render the Hemp fit to be spun into thread, it is necessary to separate the longitudinal fibres, by destroying the fibrils which connect them. This is, in part, effected by the process of watering. We have remarked, under that Head, that the Hemp begins to rot in the water, which weakens all the fibres of which it is composed; but that the smallest and tenderest are weakened more than such as are thicker and stronger: accordingly, the connecting vesicular fibres will suffer most; so that, by that process alone, a considerable progress is made towards rendering the Hemp finer by the separation of the fibres.—To complete the operation, it is necessary to brake, and beat it, by which means the vesicular fibres are broken, whilst the longitudinal fibres, which are stronger, resist the force employed to destroy the connecting web. The Brake had begun this separation of the fibres, and it is rendered more perfect by the Scutch.

Having pointed out the principal advantages to be expected from scutching, it will be expedient to reply to some of the objections that have been made to that operation, as the speciousness of them has so far deceived many of the rope-makers, as to banish it entirely from some of our ports.

FIRST OBJECTION.

The Scutch cuts and tears the Hemp, and causes a great deal of waste.

We would only desire those who are of this opinion, to repair to the workshops of the scutchers, and there to verify the following observations.

We have indeed seen Hemp which broke under the scutch; but finding that the operation of scutching did not break and tear every sort of Hemp, we endeavoured to discover from what cause this difference arose. The following are the observations made relative to this subject.

It sometimes happens, that Hemp, even in an advanced stage of its growth, will of a sudden be checked in its progress, and become weak and sickly. The roots, in such case, are thick and bulky, but the upper stalk becomes at once slender. In this case it is certainly true, that the scutch, meeting with a great resistance at the root-ends, detaches them by cutting asunder the stalk, which is very slender and weak. This is indeed a waste; but a waste that is over-balanced by the advantages resulting from the operation, as it is essentially necessary to remove these hard root-ends; and the Hemp, which breaks, is certainly of a bad quality.

It is true, that some Hemp resists the action of the scutch at the root-ends, but breaks towards the tops. If these sorts of Hemp be carefully examined, it will, undoubtedly, be discovered, that they have been watered too much, so that the tops have perished; and that being the case, is it not advantageous to cut off this defective part, which is very unfit to enter into the composition of good cordage?

At

At any rate, nothing would be gained by refraining from scutching such defective Hemp, as the same waste would happen in heckling it. Finally, I am convinced from experience, that good Hemp does not break in scutching; but that this operation only renders it fine, by dividing the longitudinal fibres, without causing a greater waste, in general, than from six to eight pounds per quintal.

SECOND OBJECTION.

Scutching weakens the Hemp.

Some rope-makers pretend, that it is dangerous to dress Hemp to too high a degree of fineness, as it thereby becomes weaker, and less fit for the manufacture of good cordadge.

That this is an error, pregnant with the worst of consequences in rope-making, has been clearly proved by a greater number of experiments.

THIRD OBJECTION.

Though it may be expedient to scutch the Hemp produced in France; yet, as the Hemp imported from the North is softer, it would be a useless labour to scutch the latter.

We allow, that it is much more necessary to scutch French Hemp than that which is imported from Riga; but we are convinced, from the result of a great number of experiments, that it is very advantageous to make the Russian Hemp, likewise, undergo the same operation.

We are, therefore, of opinion, that every sort of Hemp should be scutched; but that it is requisite to perform this operation with more care and attention on Hemp that is rough, and full of reedy particles, than onsu ch as is soft, fine, and well cleared of the boon.

Plate IV.—A. Is a scutch, inclined against the upright board of a double scutching-frame: in which is to be observed, the handle, by which

which the workman holds it; and the blade, with the edge of which he strikes the Hemp.

E.—A single scutching-frame, consiting of a piece of wood placed horizontally, which serves for a foot-board; and the upright board, with a semicircular incision or notch at top, in which the workman lays the handful of Hemp to be scutched, as is seen at B.

D.—A double scutching-frame, consisting of two uprights (with their semicircular incisions or notches), fixed to a horizontal plank, resting on the floor of the workshop.

B.—A workman holding a parcel of Hemp in his left hand, and preparing to strike it with a scutch of another description, which he holds in his right hand.

C.—A workman shaking a handful of Hemp, in order to detach the boon or reedy particles from it. Some scutched Hemp is laid across the foot-board of the scutching-frame.

G.—A workman tying the scutched Hemp in a bundle, in which state it is carried to the hecklers.

H.—A workman in the operation of Beating, as described under the head of *Beetling*.

PROPERLY speaking, Hemp is fit for market as soon as it is scutched. The operations of Beating and Heckling are performed by the various manufacturers in different degrees, according to the purposes to which it is intended to be converted; but, as these operations may be in part applied to the Hemp or Sunn produced in India, in order to separate the grossest part of the Tow, I have judged it advisable to describe them in this place.

HEMP,

METHOD OF BEATING OR BEETLING.

BEATING of Hemp was formerly performed entirely by hand; but it is now in most places done by a water-mill, which raises three heavy beaters, falling upon it alternately; the Hemp being turned all the while by a boy, in order to receive the strokes equally. The finer the tow is required, the more beating is necessary.

Encyclopædia Britannica.

The next thing is to beat or beetle the Hemp, which is done either on a block or in a trough, with a hammer or with beetles, till it feels sufficiently soft and pliable. The beetles used for this purpose are moved by hand or by water.

Chambers's Dictionary.

The first operation of the hecklers is bunching or beating the Hemp. This was formerly, and is still in some places, done by hand; but in Suffolk is now always done by a mill, which lifts up two, and sometimes three, heavy beaters alternately, that play upon the Hemp, while it is turned round by a man or a boy, to receive the beating regularly. This mill is sometimes worked by a horse, and sometimes by water.

Suffolk Report.

In some places, instead of beating the Hemp, they pass it under a millstone, in a mill constructed like those that are used for making oil of nuts or Hemp-seed. This operation, which is commonly called

pounding the Hemp, consists in pressing it every way, and by this action forces the fibres to separate and divide, by the exfoliation of that part of the gum which joined them together. They shake the Hemp and toss it different ways, that it may receive the various impressions of the mallet or the mill, during the first preparation; but still this is not sufficient to qualify it for making ropes, even of the coarsest sort.

Marcandier.

Before the Hemp is heckled, it usually undergoes a third operation, called Beetling, the design of which is to loosen, and thereby more thoroughly separate its fibres. The beetles used for this purpose are moved either by hand or by water.

Mills's Husbandry.

The strength of the longitudinal fibres of Hemp is, without doubt, far superior to that of the small fibres, by which they are joined together; or, in other words, it requires a greater force to break them than to separate them from one another; therefore, by rubbing, beetling, and striking the Hemp with reiterated blows, the workmen force the longitudinal fibres to separate from one another; and in proportion to the greater or less degree of that separation, the Hemp becomes more or less fine, elastic, and soft to the touch.

Du Hamel.

HEMP,

METHOD OF HECKLING.

THE business of a heckler consists in separating throughout their whole length the fibres of the Hemp, which the mill or the mallet have only divided in part. The teeth of the heckle carry off a part of the gum, which is thereby reduced to dust; and by dressing and dividing over again the filaments into which they enter, separate them entirely. The oftener this operation is repeated with different sorts of heckles, coarse, middling, and fine, the more the Hemp acquires of softness and fineness, whether it is intended for ropes, or to be worked into cloth.

It was in this manner the Antients prepared Hemp*. Thus some prepare it to this day; and thus customs, good or bad, are continued to perpetuity. In this manner, the Hemp prepared for cordage still retains a hardness and a gum, that render the ropes stiff, coarse, and not so fit for use. What is intended to be made into cloth, produces an ill-coloured thread, coarse, loaded with gum, and such that it cannot be used without passing it through several leys. The cloth made of it is very hard to be bleached, and cannot be brought even to a very indifferent colour, till after several months of fatigue and labour.

The

* The heckles used by the Antients had their teeth bent in the form of hooks, whereas ours are straight, and stand perpendicular to the instrument.

The heckles are various, with respect to their size, form, and fineness, according to the difference of countries, and the beauty of the works they are intended for; but in all cases, the methods of working, and the end proposed, are the same.

Marcandier.

When Hemp is intended for coarse yarn, it need only be heckled with a large-toothed heckle; but if for finer uses, it must be begun with a coarse heckle, and afterwards passed through one or more finer heckles, as occasion may require. The business of the heckler consists in separating throughout the whole length of the fibres of the Hemp, which the brake and scutcher have divided only in part. The teeth of the heckle are of iron, with sharp points. The common coarse heckle is about twenty-one inches by six and three-quarters; and the teeth in the rows are about an inch and three-quarters asunder; and extend nine inches and a half from the board in which they are fixed. They are placed in a quincunx order, so that the teeth of the second row are in the centre of the space of the first row. By drawing the Hemp through the heckle, the teeth carry off a part of the gum contained amongst the fibres of the Hemp, in the form of dust, and by dividing the filaments separate entirely the heterogeneous matter contained amongst them. To effect this purpose, the heckle being fixed upon a plank, one side of which inclines from the workman, he takes a handful of the Hemp, which grasping in his right hand, he draws through the heckle, holding the other part of the Hemp in his left hand to prevent its being entangled. After one end of the Hemp is sufficiently heckled, it is reversed, and the same operation performed on the other.

Taylor's Instructions, &c.

Of

Of the parcel of Malabar Hemp* imported by Captain Isaacke of the Skelton Castle, in 1802, and referred to in the Letter from the Lords of the Privy Council, 4th February, 1803, the Commissioners of his Majesty's Navy say: "Having consulted Captain Isaacke, we are of "opinion this Hemp could be cleaned, and even hatcheld (heckled), "in the Country, where labour is very cheap; which would reduce the "freight, and obviate a complaint which has been made, of the difficulty of hatcheling and spinning it in the state it was imported, from "the length and breadth of the fibres, which adhesion is occasioned by "the dissolution of the gummy substance, of which it should have been "purified by water, when the stems were taken away."

Report of the Commissioners of the Navy to the Lords of Trade, 27th December, 1802.

In

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* This importation by Captain Isaacke has been spoken of and considered as REAL HEMP, on account of its different appearance from the Sunn of Bengal. It has been seen, from Dr. Scott's Letter to the Bombay Government [*vide* page 21], that it is of the Genus *Crotolaria*.

The Doctor says, He does not know whether it be the same plant as the Sunn of Bengal, but the substance obtained from it is preferred to the Sunn of Bengal for cotton-ropes, where very great strength is necessary. It is far superior to any thing of the kind he has seen in the Guzzerat. This, he thinks, may depend more in the steeping of the plant and the preparation, than on any difference in the vegetables that produce it. This observation is on all probability well founded; since it will be seen by the following extract of a Letter from Dr. Roxburgh to the Governor-general of Bengal, entered on the Public Consultations, 12th February, 1801, that the substances, though apparently so different, are from plants of the same description.

"The same gentleman (Dr. Hunter) sent me seeds of the Salsette sort. They have produced plants, now in blossom; and from these I have ascertained the identity of the species."

In

In heckling, as in scutching, the operation should be performed in a spacious airy place, that the dust which it occasions may readily escape, without annoying the workmen. It should also be sheltered from wind, rain, and also the heat of the sun, when very violent.

Heckles are of various sizes, from very coarse to very fine, according to the degree to which the Hemp is required to be brought. They are simple and well known.*

The

* To the Europe Reader a description of these implements would be superfluous; but as this Work is calculated chiefly for the information of persons who are not, perhaps, very conversant in manufactures, and may be situated in parts of India where the means of information may not be readily obtained, I shall give a full description of them.

The heckle is a square frame of oak, or any hard wood, in which is inserted a number of sharp-pointed iron pins or teeth, in rows. The coarsest of these is called a Rope-Maker's Hatchel, the teeth of which are about an inch in circumference at the bottom, diminishing gradually to a sharp point. The teeth are set two inches distant from each other from point to point. The rows are six or seven in number, and are set in a quincunx-form.

The second size is called a Cagg, and differs in no respect from the other, than in the teeth not being more than eight inches in length, three-fourths of an inch in circumference, and only about an inch and a half from each other.

In the third size the teeth are from four to five inches in length, about half an inch in circumference, and set at about an inch distance.

There are also various other sizes, the teeth of which are progressively smaller, and set closer to each other. The teeth are set in rows, chequer-wise, or in a quincunx order. In this way they more effectually resist the force opposed to them, and divide the Hemp better: if they were set square, they would produce no better effect than a single row. The points of these teeth are apt to get blunt with use, and require frequent sharpening. In the manufacture of cables and other large works only the two coarsest heckles are used. The middle kind are required for the light work, such as log-lines; and the other kinds for still finer purposes.

The teeth of all heckles are made of steel, and turned in a lathe.

The heckler, who should be a man of good muscular strength, takes hold of a handful of Hemp near the middle with his right hand, twists the small end of it twice or thrice round his hand, so that the roots and one-third of the length of the Hemp hang down. He then grasps it firmly, and swings it round, so that the root-ends fall upon the point of the coarsest heckle, and pulls towards him; repeating the operation, and at every stroke engaging more and more of the Hemp among the teeth of the heckle, until his hand nearly touches the teeth.*

By this operation the Hemp is cleared from the reedy particles and dust: it is straightened and rendered finer, and those parts which were entangled or broken remain in the heckle, as likewise a part of the roots; the remainder of the roots are disengaged by twisting them round the twitch-pin, and breaking them off with a powerful twitch or jerk. The workman repeats this operation till he leaves no more roots adhering to the end of the handful of Hemp he is preparing: having then drawn it twice through the heckle, this part of the handful of Hemp is finished.

He then proceeds to heckle the top-end in the like manner, except that it is only necessary to break off some of the fibres which exceed the others in length.

The thick end should be heckled first, because the roots, when entangled or twisted round the teeth, render it necessary that the heckler should pull with a force, to which the strength of Hemp that had before been heckled and rendered fine, could not resist: and for this reason, all good workmen hold the Hemp pretty near the roots, because the fibres thence gradually decrease in size, and become proportionably weaker.

It

* In doing this (after four or five strokes) he should break off the ends of the Hemp, to render them even. This is done by twisting the ragged ends round a twitch-pin, which is a stout iron pin fixed by the side of the heckle. This is sometimes done with the teeth of the heckle, but is apt to bend them.

It is a matter of importance, that the workmen do not at once, introduce too much of the Hemp among the teeth of the heckles: on the contrary, they should at first introduce only a small part near the end, and the rest by degrees, as far as the part they hold in their hand. Hemp is heckled for the purpose of disentangling it, dividing its fibres, and rendering it finer; and therefore, it may be easily conceived, that if too great a length of Hemp were at first introduced among the teeth of the heckles, it would be twisted into knots, which would resist the efforts of the workman, till the fibres of which they are composed were broken asunder.

Thus, instead of being disengaged, the Hemp would be broken and torn asunder; the *Firsts* or as they are by some termed *Longs*, would be reduced to *Toppets*, or at least so much shortened, as to be fit only to be classed among the *Seconds*, which would diminish the useful part by increasing that which is not so useful. This inconvenience and loss may be prevented by introducing the Hemp gradually into the heckle, and by proportioning the effort in pulling to the strength of the fibres. It is in this respect that an experienced workman distinguishes himself, by producing a greater quantity of Hemp of the first quality.

Some Hemp is so excessively long, that it is necessary to break it*; for it must not be cut, as the ends, where it is cut, are thick, and such fibres cannot be joined so perfectly in spinning, as when the Hemp terminates gradually.

If it were possible to spin the fibres of Hemp thoughout their whole length, it is certain they could never be too long: they would, on the contrary, more easily join to each other, and would require less twisting

* This refers to Italian Hemp only.

twisting to prevent them from separating, which is a considerable advantage. When the Hemp is from six to seven feet long, the spinners, being unable to extend its whole length in the thread, are obliged to double it, which renders the thread less strong and perfect. It is sufficient if the *firsts* be three feet long *.

When it is found necessary to break the Hemp in two, the heckler takes a small part of the handful in his left hand, twists it round one of the teeth of the coarse heckle†, and, pulling forcibly with the right, breaks the Hemp in the same manner as when separating the roots. Then he takes another parcel of fibres, on which he performs the same operation, until the whole handful be broken in two.

If the Hemp be not excessively long, the hecklers must be strictly prohibited from breaking it; for it is preferable to let the spinners have a little more trouble, than to suffer the hecklers to break part of the fibres only a foot or a foot and a half in length.

When the Hemp requires to be so divided in two, care must be taken that it be broken in the middle: for it is much more advantageous to have only *firsts*, though rather short, than to convert into *seconds* any of the Hemp which might have furnished *firsts*.

The middle of the Hemp should be as carefully heckled as the ends: but some timid or awkward workmen, being afraid of pricking their fingers, do not let their hand come near the heckle; the consequence of which is, that they dress only the ends; the middle remaining almost untouched, which is a very great defect.

Du Hamel.

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* The *firsts* are more esteemed if five or six feet long. R. W.

† This is better done with the twitch-pin.

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